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ABSTRACT

A study was conducted to determine the Jungian personality types of selected groups of student and registered nurses, to identify their preferred learning styles, to ascertain the relationship between personality type and preferred learning style, and to identify the most productive learning styles for given personality types. Subjects' personality types were measured by the Myers-Briggs Type Indicator, while preferred learning styles were measured by the Media Effectiveness Chart. Results of the study indicated personality type differences among and between both student and registered nurses, a relationship between personality types and preferred learning styles, and that certain teaching methods were most productive for each personality type. Detailed analyses of the identified relationships are presented throughout the text. Based on the study findings, it was recommended that educational programs should be structured in such a way as to accommodate varying personality and learning styles, and that discussion seminars be regularly scheduled so that students might learn how various personality types contribute to their own learning. It was also suggested that learning experiences be provided for instructors with regard to personality type and learning style in order that optimum student development and learning experiences might be arranged. (JDS)

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Learning Styles Relevant to Identified Personality Types of Selected Nursing Students and Selected Successful Registered Nurses

BEST COPY AVAILABLE

HARRIETTE B. RITCHIE

A MAJOR APPLIED RESEARCH PROJECT
PRESENTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR
THE DEGREE OF DOCTOR OF EDUCATION

NOVA UNIVERSITY

1975

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To My Parents and Family

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ABSTRACT

Ritchie, Harriette Burns. "Learning Styles Relevant to Identified Personality Types of Selected Nursing Students and Selected Successful Registered Nurses." Unpublished Doctor of Education dissertation, Nova University, 1975.

The problems of this major research project were to determine the Jungian Personality Function Types of selected student nurses and selected successful registered nurses, to identify preferences for learning styles of selected student nurses and selected successful registered nurses, and to compare the personality type learning styles of the groups cited. Specifically, answers were sought to the following questions:

1. What are the personality types of selected nursing students and selected successful registered nurses?
2. Are there differences in preferred learning styles among different individuals?
3. Are there differences in learning styles among different personality types?
4. Of the personality types of individuals where teaching method does matter, which of the teaching methods is most productive for each personality type?
5. Is there a difference in the personality type learning style of student nurses and the personality type learning

style of selected successful registered nurses?

Personality types were measured by the Myers-Briggs Type Indicator, while preferred learning styles were obtained from the Media Effectiveness Chart. Data from selected nursing students enrolled in a two-year community college registered nurse program and from selected successful registered nurses employed in a metropolitan area's health facilities were computed and formed the information base for this study.

The major significant findings of the study were:

1. Student nurses were distributed in 13 of the 16 Latin Squares of the Jungian Personality Function Type Table. Successful registered nurses were distributed in nine of the 16 Latin Squares on the Jungian Personality Function Types Table. The majority of student nurses clustered in the square ESFJ, while the selected successful registered nurses were mainly distributed between the squares of ISTJ and ENFP.
2. Student nurses and registered nurses, individually, preferred to learn by certain teaching methods. It was seen in this study that both students and successful registered nurses least desired to learn by methods that involved only audio recordings. Students ranked lecture as their most preferred instructional method. Registered nurses ranked readings as their most preferred instructional method.

3. Student nurses with the personality types of ENFP and ESFP rated lecture as their preferred method of teaching. The personality types of ESTJ and ENFJ listed readings as their preferred learning style. The INFJ and ESFJ rated tutorial as their preferred learning style. The ISFJ and the ISFP preferred field trips as their number one learning style. The student nurse with the personality type of INFP preferred discussion as a first choice in learning style. The ISTJ listed programmed learning as their preferred learning style. The ESTP equally preferred demonstrations/role playing and motion pictures/TV. The ENTP preferred small group work as a method of instruction.

   Registered nurses with the personality types of ISTJ, ESFJ, and INFP rated laboratory as their preferred learning style. The ENFP preferred small group work as a method of instruction. The ESFP equally preferred small group work, motion pictures/TV, field trips, and demonstrations/role playing. The registered nurse with the personality type of ESTP listed pictures/slides as her preferred learning style. The ISTJ equally preferred discussion and tutorial learning styles. The ISFP preferred demonstrations/role playing as a method of instruction.

4. It was seen that the student nurse with the same Jungian personality type as that of the registered nurse preferred to learn by a different style. An example of

this: the student nurse with the personality type of ESFP preferred lecture as a method of instruction, while the registered nurse with the personality type of ESFP preferred to learn by laboratory. The student nurse with the personality type of ENFP preferred to learn by lecture, while the registered nurse with the type of ENFP preferred small group work.

The major conclusions of the study were:

1. The personality types of student nurses and successful registered nurses correspond to their respective areas of school and health facility employment.
2. There are similarities and diversities of personality type between student nurses and registered nurses.
3. There are similarities and diversities of preference for learning style among individuals within the groups of selected student nurses and selected successful registered nurses.
4. Educational programs should be structured to allow for the similarities and differences of personality type learning style between student nurses and registered nurses.
5. There is a need to provide learning experiences for instructors regarding to personality type and learning style in order to provide optimum student development and learning, being cognizant of personality similarities and differences.

Implications were formulated as a foundation upon which curriculum for student nurses would be strengthened and improved, and for the humanization of relations between nursing educators and registered nurses who are health facility employees.

Chapter 1

INTRODUCTION

The learning styles of students should be recognized and responded to. Just as cultures change, so do the needs of the individuals living and learning within them. To motivate students to learn in the most productive manner, teaching methods must be kept current with the rapid changes in society. Unless students are understood individually with regard to the learning style from which they can learn most effectively, new offerings will not produce growth. Higher education in America must be dedicated to adapting curriculum to varied student needs, purposes, and capabilities.

With this goal in mind, individual students must be understood in terms that can be predictive of the learning style that will maximize student characteristics he will bring to and develop during the learning situation. As new methods of instruction are provided, instructors' attitudes will influence these offerings. Injecting a student into a laboratory setting with new equipment will be of little value unless the learning experience is planned with assessment of the student's characteristic learning style as a guide. Without assessment of individual learning style as basic, new equipment will be offered with the same results as outdated

educational offerings. Instructors and students must cooperatively build the educational setting.

The Educational Testing Service findings (1974) reported that:

> A new study of teaching styles that appeal to different types of community college students has yielded information that promises to be useful in adapting instruction to increasingly diverse student needs. With the current trend toward universal access to higher education, this problem--accommodating individual differences--is becoming acute, particularly at two year colleges, where the influx of other-than-typical students is greatest.
>
> Accommodation to varied student purposes and capabilities is traditional in American higher education. In the past, it was relatively simple because the range of differences was narrower. Two means were generally employed. In the system as a whole, institutions differed in the selectivity of their admission policies, pre-sorting students by level of academic skill and by inclination. Within a single institution, students were given choices--major fields of study, elective courses--that reflected their individual goals and interests.
>
> For assorted social and economic reasons, complex and familiar, these devices will no longer suffice. The range of individual differences is greater not only throughout the system and within the institutions, but within single programs and, indeed, single classrooms. New means of accommodating student diversity are clearly needed, and one approach is to assess the personal preferences or learning styles of the students and adapt instructional procedures accordingly (Warren, 1974).

Eble (1972) commented that many students encountered want something to do. They want their talents to be put to use. Furthermore, he related, his cross-country personal survey that was experienced for one year revealed the need for classroom change. Students were bored! The lecture method needed to be replaced with a dynamic process of learning that would bring about attitudinal change on the part of the student. The environment had to be manipulated to bring about that change.

In order to provide a foundation for the student to learn in the way most advantageous to him or her, this study was undertaken for the purpose of identifying the personality types of selected student nurses and selected successful registered nurses, and then relating individual personality types to learning styles most productive for the student nurses and the registered nurses.

Rapid and efficient assessment of personality types is made available to educators through the development of the Myers-Briggs Type Indicator (MBTI), with one of its primary purposes that of relating personality type to learning style. Data predict understandable differences among MBTI-defined types in: (a) academic achievement, (b) levels of education, (c) fields of study, (d) creativity, and even (e) intelligence (Roberts, 1974).

The Myers-Briggs Type Indicator, which reflects the Jungian Personality Function Types, is designed to implement Jung's theory of psychological types, which assumes

> . . . much apparently random variation in human behavior is actually quite orderly and consistent, being due to certain basic differences in the way people prefer to use perception and judgment.

The Indicator furnishes useful knowledge on

> . . . how a person goes at things, how he habitually behaves or prefers to behave in activities which call for the processes of perception and judgment (Myers, 1962).

Type theory holds that ". . ..type differences yield differences in interest, values, and problem-solving techniques. . . ." "In type theory, the intrinsic appeal of any

kind of work . . . lies in the chance to use the mental processes one likes best, in the way one likes to use them" (Myers, 1965).

As interest in MBTI grew, two avenues of study relating personality types to education developed. One avenue is concerned with better understanding of how teachers teach. Starting from data on group effects in large samples, the move is now toward applications to the individual student or teacher. One of the most prevalent questions today is what knowledge of a student's type tells about the learning experiences most productive for him. It is stated there is an underlying need for a study which will assess personality processes of students which are relevant to learning styles (Roberts, 1974).

By using data from the MBTI, health educators would be provided with a better understanding of the types of persons in the health profession of nursing. From effective utilization of the Indicator's data, planning in curriculum would be initiated utilizing the personality type of the individual nursing student and registered nurse as it correlated to preferred learning style.

STATEMENT OF THE PROBLEM

The problem of this study was to answer:

1. What are the personality types of selected nursing students and selected successful registered nurses?

2. Are there differences in preferred learning styles among different individuals?
3. Are there differences in learning styles among different personality types?
4. Of the personality types of individuals where teaching method does matter, which of the teaching methods is most productive for each personality type?
5. Is there a difference in the personality type learning style of student nurses and personality type learning style of successful registered nurses?

HYPOTHESES

The hypotheses tested in this study were as follows:

Null Hypothesis 1 (H_o^1): There are no personality type differences between selected student nurses.

Null Hypothesis 2 (H_o^2): The method of teaching does not have an effect on students' learning.

Null Hypothesis 3 (H_o^3): The personality type of students does not affect the method of teaching (each personality type was measured for significance).

Alternative Hypothesis 3 (H_1^3): Of the personality types of students where teaching method does matter, certain teaching methods are most productive for each personality type.

Null Hypothesis 4 (H_o^4): There are no personality type differences between selected successful registered nurses.

Null Hypothesis 5 (H_o^5): The method of teaching does not have an effect on successful registered nurses' learning.

Null Hypothesis 6 (H_o^6): The personality type of successful registered nurses does not affect the method of teaching (each personality type was measured for significance).

Alternative Hypothesis 6 (H_1^6): Of the personality types of successful registered nurses where teaching method does matter, certain teaching methods are most productive for each personality type.

Null Hypothesis 7 (H_o^7): There is no difference in the personality type learning style comparison between students and successful registered nurses.

Null Hypothesis 8 (H_o^8): There is no difference between the personality types of students and those of registered nurses.

DEFINITION OF TERMS

Learning Styles: The personal preferences of individuals participating in this study, as to the method of teaching or media in which instruction was most productive for them.

Method of teaching: Various forms of media, as presented on the Media Effectiveness Chart.

Myers-Briggs Type Indicator (MBTI): This is a 166-item self-administering, self-validating instrument published in 1962 by the Educational Testing Service (ETS). The MBTI and the supporting research stemming from its development expanded and clarified Jung's theory that seemingly random variation in human behavior is not really due to chance; it is, in fact, the logical result of basic observable and even

measurable differences in mental functioning.

These basic differences concern the way people use their perceptual mechanisms, their ability to be aware of people or things or occurrences or ideas, and the way they use their judgmental processes to come to conclusions about what has been perceived. Since the two together--perception and judgment--are central to a person's mental activity, they must logically determine, to a great extent, the person's overt behavior.

The theory states further that there are two ways of perceiving--by sensing or by intuition, and two ways of judging--by thinking and by feeling. Whichever of these ways is favored by the individual, he will also show a tendency toward introversion (turning inward) or extroversion (turning outward). Thus we have in the MBTI the following four pairs of preferences, from which sixteen different combinations of personality type may be derived:

Extroverted (E)--Introverted (I): The direction of interest.

Does the subject's interest flow mainly to the outer world of actions, objects, and persons (E) or to the inner world of concepts and ideas (I)?

Sensing (S)--Intuitive (N): How situations are perceived and experienced.

Does the subject attach more importance to the immediate realities of direct experience (S) or to the inferred meanings, relationships, and possibilities

of experience (N)?

Thinking (T)--Feeling (F): Judgmental preferences.

In making judgments, does the subject rely more on logical order and cause and effect (T) or on priorities based on personal importance and values (F)?

Judging (J)--Perceptive (P): Life style.

Does the subject prefer to live in the judging attitude, planning, ordering, and organizing his world, deciding what needs to be done and systematically attempting to do it (J), or in the perceptive attitude, spontaneously, curiously awaiting events and adapting to them (P)?

The preferences in type processes result, therefore, in the sixteen combinations given here (in the tabulation) (Roberts, Fox, and Branch, 1974).

MBTI TYPE TABLE

	SENSING		INTUITIVE		
	THINKING	FEELING	THINKING	FEELING	
JUDGING	ISTJ	ISFJ	INFJ	INTJ	INTROVERSION
PERCEPTIVE	ISTP	ISFP	INFP	INTP	
JUDGING	ESTP	ESFP	ENFP	ENTP	EXTROVERSION
PERCEPTIVE	ESTJ	ESFJ	ENFJ	ENTJ	

Selected student nurses: Participants who volunteered to take part in this study. They were enrolled in the two-year Associate Degree program in a community college. They were not the "typical" community college student. In order to enter the nursing program their grade point average had to be at least 2.2, with prerequisites that included English 1A, high school algebra, and chemistry, with a grade of "C" or better within the last five years. This group was composed of all white females between the ages of 19 and 45 years. Two men were 29 and 35 years of age. There was one black female in the group. These students came from the middle socioeconomic class surrounding a suburban community college.

Selected successful registered nurses: Registered nurses who were registered by the State Board of Nursing and employed and volunteered to participate in this study.

The Media Effectiveness Chart (MEC): This was the instrument used in correlating preferred instructional media (learning style) with the personality type.

The chart listed types of instructional media on the vertical scale. They were: (1) lecture, (2) discussion, (3) small group work, (4) audio recordings, (5) readings (texts, articles, etc.), (6) programmed instruction, (7) pictorial, (8) symbols (maps, charts, diagrams), (9) pictures, slides, (10) motion pictures, television, (11) field trips, (12) demonstrations, (13) role playing, and (14) laboratory work. The horizontal scale divided "learning" into six parts. They were: (1) learning factual

LEARNING OBJECTIVES AND MEDIA EFFECTIVENESS

INSTRUCTIONAL MEDIA	1. LEARNING FACTUAL INFORMATION	2. LEARNING VISUAL (AUDIO* IDENTIFICATIONS	3. LEARNING PRINCIPLES AND CONCEPTS	4. LEARNING PROCEDURES	5. PERFORMING SKILLED PERCEPTUAL MOTOR ACTS	6. DEVELOPING DESIRABLE ATTITUDES AND MOTIVATIONS
VERBAL						
LECTURE	MED	MED	LOW	LOW	LOW	HI-MED-LOW
DISCUSSION	LOW	LOW	MED	MED	LOW	HI
SMALL GROUP WORK	MED	MED	LOW	LOW	MED	HI
AUDIO RECORDINGS	MED	HI*	MED	MED	LOW	MED
READINGS (TEXTS, ARTICLES)	MED	LOW	MED	MED	LOW	MED
PROGRAMMED INSTRUCTION	HI	MED	HI	HI	LOW	LOW
PICTORIAL	HI	MED	HI	HI	HI	HI
SYMBOLIC						
SYMBOLS (MAPS, CHARTS, DIAGRAMS)	MED	HI	MED	MED	LOW	LOW
PICTORIAL						
PICTURES/SLIDES	MED	HI	MED	MED	MED	MED-HI**
MOTION PICTURES/TV	MED	HI	HI	MED	HI	MED-HI**
ENVIRONMENTAL						
FIELD TRIPS	MED	HI	MED	MED	LOW	HI
DEMONSTRATIONS/ROLE PLAYING	MED	HI	HI	MED	MED	MED
LABORATORY WORK	MED	HI	HI	HI	HI	MED

**Depends entirely upon appropriateness, quality, and length of presentations.

information, (2) learning visual (audio) identifications, (3) learning principles and concepts, (4) learning procedures, (5) performing skilled perceptual-motor acts, and (6) developing desirable attitudes and motivations. Thus all types of learning were represented by these six categories ranging from cognitive to psychomotor to affective domains. Each correlating block within the chart was marked by scores of high, medium, or low based on learning style preferences (Allen, 1960; Tosti and Ball, 1969).

The specific rankings were based upon the polling of 354 community college teachers in all parts of the United States by Roberts.

Personality Type-Learning Style: Relationship of personality types to preferred learning style as measured by the analysis of variance: one-way classification using the F score, and the z score, significant at the .05 level.

DELIMITATIONS OF THE STUDY

This study was conducted at a northern California community college with a total enrollment of 23,000 and the health facilities serving the area. This was a community college located in the suburban area of a metropolis and derived its students from middle class society of many races, creeds, and nationalities.

This study was limited to those students and registered nurses who answered the MBTI and MEC.

Personality data collected for the study were limited to Jungian typologies as measured by the Myers-Briggs Type Indicator. This study was also limited to the learning styles as listed on the Media Effectiveness Chart.

The population studied was limited to community college nursing students in the area and to registered nurses licensed by the California State Board of Nursing and practicing in the area.

JUSTIFICATION FOR THE STUDY

A search of the literature revealed that no published studies have been done that correlated student personality type and registered nurse personality type to the individually preferred style of learning. This study was needed not only in helping nursing educators to understand how students and registered nurses learn most productively, but could be used in the future in the planning of the curriculum, vocational counseling, recruitment, and as a tool in understanding nurses better. It could provide a basis for indicating students' attitudes and measuring the change in student attitudes as affected by instructional offerings.

Fellers (1972) stated that:

> . . . today young people are demanding that their education become more "meaningful." They are saying that the institutions need to cease accepting the platitudes that have been postulated without proof, and find out by experimentation what is effective in teaching, and alter their methods to implement better education. However, to make changes in the curriculum without first doing research to find out what needs to be changed might only provide new mistakes to replace the old ones.

A common practice in community colleges is policy that requires each course outline to be reviewed at least every two years. The purpose of this technique is to keep the courses current and to improve the educational offerings of the college. To accomplish this, committees are constantly at work on the curricula. To date, however, no effort has been expended to assure that students are learning as productively as possible in the learning style they prefer. An outcome of this study was that it showed comparisons between students' personality type and their preferred learning style, resulting in a method of predicting how students will learn most effectively. This offers curriculum revision committees valuable data for consideration when revising courses and methods of presentation.

Registered nurses successfully employed are required by legislation to update their knowledge and increase their skills. The purpose of this policy is to keep registered nurses skillful and current in their profession. There has been no investigation to ensure that registered nurses are being provided education to learn as effectively as possible in the learning style they prefer. Another outcome of this study was that it showed comparisons between registered nurses' personality type and their preferred learning style, resulting in a method of predicting how registered nurses learn effectively. This offers health facilities and educational administrations valuable data for consideration when offering courses and in-service education.

Through an identification and understanding of the personality type learning style of students and registered nurses, educators and employees are provided with reliable data which can be utilized both in the educational institution and in the health care facility.

Chapter 2

REVIEW OF LITERATURE

Although a number of research studies have dealt with the personality characteristics and attitudes of health professionals, none was found that correlated personality type with individualized learning styles. Some, however, provided valuable background information and direction for this study.

Lehman administered a battery of cognitive and affective tests to 1,310 females entering as freshmen at Michigan State University in the fall of 1958 (1965). He found that premedical technology female students had the highest scores on a number of cognitive measures but were the most dogmatic and stereotypic of the six female curricula groups which he studied. It was also concluded that these students were the most traditional value oriented, most "inner directed," thus suggesting that these students displayed a personality syndrome that was characterized by authoritarianism, nonreceptivity to new ideas, and inflexibility. Lehman suggested that the rigid and authoritarian females tended to prefer home economics and medical technology and favored the technical or vocationally oriented curricula, while the more flexible, adaptable females favored the nontechnical curricula. Lehman also found evidence that

the women who exhibit a system of values embracing absolutism, a positive outlook toward the future, the importance of getting along with others, and conformity entered, for the most part, the technical or vocationally oriented curricula.

Dunteman, Anderson, and Barry (1966) administered a series of psychological tests to freshmen and sophomore white female students enrolled in the course, Introduction to the Health Professions, at the University of Florida. The professions of occupational therapy, physical therapy, and medical technology are discussed in particular in this course. At the beginning of the course, students were asked to state a preference for occupational therapy, physical therapy, or medical technology training. Students were then grouped according to their stated preference. The results from the tests suggested that occupational and physical therapy students had more female characteristics, were more interpersonal and service oriented, less intellectually oriented, and scored slightly lower on a standardized achievement test than the medical technology students. The results also showed that the medical technology group had little interest in vocations of a nontechnical nature or those involving extensive dealings with other people.

Solkoff and Markowitz (1967) studied the personality characteristics of 178 male freshmen medical students and 198 male freshmen law students from the 1964 and 1965 classes of a large eastern university. Their study showed that medical students tended to be more sensitive, more prone to worry,

more idealistic, and more socially perceptive and responsive to interpersonal nuances, than the law students. Findings from the study also showed that medical students expressed greater pessimism with respect to their professional careers and more often exhibited a greater lack of confidence in their abilities. Medical students appeared more introspective, idealistic, and more sensitive to the needs of others.

Roberts, Fox, and Branch (1974) described the Myers-Briggs Type Indicator (MBTI) as a 166-item self-administering, self-validating instrument published in 1962 by the Educational Testing Service (ETS). The MBTI and the supporting research stemming from its development expanded and clarified Jung's theory that seemingly random variation in human behavior was not really due to chance; it was in fact the logical result of basic observable and even measurable differences in mental functioning.

Bowling (1973) described the Myers-Briggs Type Indicator typing of 158 practicing medical technologists. Of the 158 medical technologists, 88 (55.7%) favored Sensing, 80 (50.6%) chose the Feeling preference, while 78 (49.4%) chose the Thinking preference, and 103 (65.2%) favored the Judging preference in contrast to the Perception preference in dealing with the outer world.

The Jungian Personality Function Type most prevalent among the 158 medical technologists was ISFJ, with 23 (14.6%) individuals. Twenty-two (13.9%) of medical technologists were classified as the ISTJ personality type, while 17 (10.8%)

subjects were the ESTJ type. The personality type ENTJ contained 13 (8.2%) medical technologists while 12 (7.6%) of them were classified as the ESTJ personality type.

Myers and Davis (1965) did a 12-year follow-up study of 4,270 doctors who took the MBTI as freshmen medical students. Out of this sample, 146 students became pathologists. Of the 146 pathologists, 62 percent had a preference for Introversion (significant at the .01 level), 68 percent favored Intuition (significant at the .001 level), 65 percent expressed a preference for Thinking as opposed to Feeling, and 58 percent exhibited a preference for Perception in contrast to Judgment in dealing with the outer world.

The study found the following Jungian Personality Function Types attractive to those medical students who became pathologists:

ISTJ--1.74 (significant at the .05 level)

INTJ--1.99 (significant at the .01 level)

INTP--1.78 (significant at the .01 level)

The figures were ratios of the percent of the type in the speciality divided by the percent in the entire sample. Ratios greater than 1.00 mean that more of the type chose a particular speciality than would have been expected.

Stephens administered the Myers-Briggs Type Indicator to 93 senior students from Fine Arts, Art Education, and Occupational Therapy at the University of Florida during the fall quarter, 1971. He found that Fine Arts subjects were more Introverted (75.7%) than Extroverted (24.3%), more

Intuitive (91%) than Sensing (9%), more Feeling (60.5%) than Thinking (39.5%), and more Perceptive (66.7%) than Judging (33.3%). These data tend to indicate preferences for Introversion, Intuition, Feeling, and Perception among Fine Arts seniors on the four variables.

Art Education subjects were almost evenly divided on Introversion (51.6%) and Extroversion (48.4%), more Intuitive (87%) than Sensing (13%), more Feeling (77.4%) than Thinking (22.6%), and more Perceptive (71%) than Judging (29%). These data tended to indicate preferences for Intuition, Feeling, and Perception on three of the variables and tended to be neutral on the Extroversion-or-Introversion variable.

Occupational Therapy subjects were more Extroverted (75.9%) than Introverted (24.1%), more Intuitive (65.5%) than Sensing (34.5%), more Feeling (82.8%) than Thinking (17.2%), and slightly more Perceptive (58.5%) than Judging (41.5%). These data showed that Occupational Therapy subjects differed from Fine Arts subjects more than they differed from Art Education subjects on the four variables. Data also showed an uneven distribution of personality types among the Occupational Therapy subjects and indicated that Occupational Therapy type preferences were different from those for Fine Arts and Art Education subjects. These data indicated a clustering of subjects within particular personality categories, and yet showed a considerable diversity of personality types among seniors in Occupational Therapy.

In the process of his investigation Stephens found that the MBTI isolated perplexities of personality which concerned curriculum leaders in their efforts to effect a learning ambience appropriate for art and the college senior. Information on personality types should facilitate application of the most "natural" and effective methods of instruction while maintaining optimum standards in teaching and learning. He suggested that, with such aids, art programs could be planned that would increase satisfactions and diminish frustrations for both student and teacher.

Sperry (1973) presented a theoretical understanding of learning styles in relation to educators and counselors.

> It is becoming increasingly clear that twentieth-century man is not acting and reacting to life in a vacuum but rather in a context. Every day he must come to terms with the environment of which he is a part. This is particularly true when one considers the dimensions of human learning, whether in a classroom or a counseling context. Here a learner interacts with an environment--a book, a programmed unit, a teacher, or a counselor. The learner changes or is educated through this interaction. The outcome and quality of this interaction are in large part a function of relevant feedback from the environment to the learner, feedback that fits the learner's particular way of learning--his learning style.
>
> The study of learning, or cognitive, style has been widely researched by learning specialists, although counseling specialists have yet to explore this topic in depth. Yet there is every indication that learning style research has many applications to the field of counseling. The most direct applications appear to be in school settings where counselors serve as consultants to classroom teachers, but counselors in rehabilitation, employment, and vocational settings also can profit from an understanding of learning styles in clients.

The study of learning or cognitive style has been researched by learning specialists. De Cecco (1968) defined

learning style as personal ways individuals processed information in the course of learning new concepts and principles. Many educators have agreed that no two students learn the same thing in the same way or at the same rate. There are some students who learn more easily through reading, others through listening, and still others through doing things physically.

Research on learning styles could best be considered in terms of three dimensions: learning modality, learning tempo, and learning differentiation. The discussion of these dimensions focused on assessment and suggestions for optimizing the learner's performance.

Learning modality was seen in terms of personal preference for interacting with the environment through one of the basic senses. Seeing, hearing, touching, smelling, and tasting were involved here. He felt that an example of this was described by what an individual attended to, thought about, and remembered when seeing a movie. If the individual had a precise recollection of the scenery, this would indicate a visual modality. An individual who remembered vividly the dialogue and background music would indicate an auditory modality. The physical modality would be indicated by a person being able to re-enact some of the movements of a particular scene.

> . . . Memory is one aspect of cognitive functioning, and thinking is another. When a person thinks visually, he thinks through images and uses his mind's eye. In contrast, verbal thinking, using the "mind's ear," does not involve images. And kinesthetic, or physical, thinking

> consists of having a mental "feeling" of the texture, contour, and consistency of the environment, as through the mind's hand (Bissell, White, and Zivin, 1971).

The dominant learning modality of an individual appeared to be formed early in life and apparently did not change much as he progressed into adulthood. For example, a student who learned chiefly by listening and speaking (aurally) was not likely to change and become an outstanding reader. In similar fashion, the individual who learned best by a physical approach to learning will probably always learn best by that modality.

Of what significance could this information be to educators? It was felt that, although adults have a dominant sensory preference, the three modalities usually worked together. For example, knowledge gained from one modality supplements knowledge derived from another modality. The implications for classroom teaching were then clear.

Riessman (1964) has suggested that:

> In order to teach reading to a student who is not basically a visual learner, the teacher must help the student to take advantage of the strengths inherent in the kinesthetic modality in order to balance his weakness. For such a student the teacher might use roleplaying, dancing, or singing. Then when the student is confident that he has comprehended the story line, the teacher can help him to focus on the sounds and symbols that also convey the message of the story. For the auditory learner, the teacher can read the story and question the learner's comprehension. Only then can the teacher proceed to the written word. Classroom grouping could be arranged in terms of modality, thus allowing the teacher to develop instructional materials for the groups based on sense preference.

The learning tempo was described informally as the reflection/impulsivity dimension. This could be assessed by

observing the student's behavior in the following ways: Did the student respond to questions immediately and spontaneously (impulsively) or more slowly, deliberately, and cautiously (reflectively)? Did the individual's answers suggest that he had grasped the first part of the original question (impulsive) or all of it (reflective)?

Were the student's answers usually accurate (bright) or inaccurate (dull)? There were four categories into which the student could fall: impulsive and bright, impulsive and dull, reflective and bright, or reflective and dull. Of course, teachers, students, and classmates would have different perceptions of these types (Yando and Kagan, 1968).

> . . . If an impulsive student is of high ability, he is likely to be perceived by the teacher as being very bright because he responds rapidly to the teacher's questions with correct answers. The impulsive student of low ability is likely to be perceived by both teacher and classmates as a "failure," a "wise guy," or a "dummy" because of the answers he blurts out. Interestingly, Kagan (1965) has observed that reflective students of low ability consider themselves more capable than their impulsive counterparts.
>
> In another way, the impulsive student is at a disadvantage in classroom interactions. Teachers tend to perceive the behavior of these students as disruptive, hyperactive, and distracting. It may well be that certain students who are labeled as having "learning disabilities" may not have minimal brain dysfunction at all but may actually have impulsive learning tempos.

Yando and Kagan (1968) showed that the educator could provide assistance to the impulsive learner. Both experimental and field studies have shown that experienced reflective teachers working with groups of impulsive students were able to foster reflectiveness in their students. It was suggested that vocational guidance could influence reflective persons

to go into occupations such as computer programming or accounting, while a more impulsive person would go into sales work, teaching, or become an umpire, in order to best use his natural characteristics.

Sperry (1973) concluded his discussion by stating that there was a need to understand learning style differences of individuals. It was obvious that much more theory and research were needed in this area.

> The need to understand individual differences--especially learning styles--is emerging as the number one priority for the teacher and the counselor. Hopefully, the consideration of these three dimensions of learning style, the assessment questions, and the suggestions will be of some help to counselors in all settings. It is obvious that much more theory and research is needed in this area, but it is equally obvious that a counselor functioning as a consultant to classroom teachers must become more conversant with individual differences in the learner and the ways in which these differences affect the student's success in learning and his consequent view of himself.

Hill (1974) stated that it is time we adjusted our teaching styles to the learning styles of each student. He felt that students should be taught as though they would pass, not as though they would fail. Computer analysis had been used to process results of cognitive style mapping. Hill worked out cognitive style maps whereby one individual's variables for learning could be assessed. Faculty could respond appropriately after they knew the way in which a student learned best. Learning environment could be created for an individual with programmed materials, informal conferences, or a combination of all of these approaches.

In conclusion, Hill stated:

Instead of the standard battery of diagnostic tests which most students undertake, Oakland [Hill's college] asks them to participate in such diverse activities as tasting cheese, listening to music or assembling puzzles.

In one test, for example, we ask the students to walk a line--but we put a chair in the way. What they do tells us whether they're likely to follow instructions to the letter or go their own way.

We know everybody is different. Some feel and see and hear things that others don't. Some reason logically, others impulsively. To pull together all these variables we have programmed an IBM computer to process test results and produce a "map" of each individual's style of learning--his cognitive style. With these maps we can personalize study programs and put each student in a learning situation which is best for him.

The study program does not rule out the traditional classroom and lecture hall method, but offers alternatives to students who are geared to learning better in other ways.

Chapter 3

METHOD OF STUDY

This was an experimental study aimed at discovering the relation between personality types of students and registered nurses, and their preferred learning styles. This study utilized two instruments, The Myers-Briggs Type Indicator and the Media Effectiveness Chart (MEC).

INSTRUMENTS

1. The Myers-Briggs Type Indicator (MBTI) was the instrument used in typing individual personalities. The MBTI is described in Chapter 1 under the section entitled Definition of Terms. Further description is given here.

Each question in the MBTI was selected for a specific theoretical reason, to detect clues in ordinary behavior which could identify the underlying preference. Since the test was designed for use in educational and occupational guidance, the questions were designed to be nonthreatening, without pathological orientation. Items were presented in a forced-choice format, each choice constructed to be equally attractive to the type to whom it was directed. Items were scored on only one index and item correlations with scales other than their own ranged from only .07 to .12 (Myers,

1962). There were two classes of items in the test-phrase questions and word pairs in which the subject could choose the word he preferred in each pair (Bowling, 1973).

Reliability studies were internal consistency (split-half) measures, showing correlations in the .70 and .80 range for continuous scores, which was comparable to those of leading personality inventories. Internal consistency reliabilities for the scales EI, SN, TF, and JP range in general from .74 to .90 (Bowling, 1973).

2. The Media Effectiveness Chart (MEC) was the instrument used in correlating preferred instructional media (learning style) with the personality type. This chart was described in Chapter 1 under the section entitled Definition of Terms. All types of learning were represented by the six categories represented in the chart, ranging from cognitive to psychomotor to affective domains. Each correlating block within the chart was marked by scores of high, medium, or low, based on learning style preferences.

DATA COLLECTION

The MBTI was administered to selected student nurses taking the Pediatric Nursing course at the community college. They had volunteered to be participants in this study. Group administration was the manner chosen for the students taking the MBTI. The examiner asked the students to read the directions on the cover of the MBTI booklet, Form F, silently while she read them aloud. Any questions regarding the

mechanics of answering were cleared up before the students were directed to proceed through the instrument. The examinees were not allowed to discuss any of the items or alternatives among themselves.

SUBJECTS

The student nurses, described in Chapter 1 under the section entitled Definition of Terms, were in their second year of the two-year Registered Nurse Program, so attrition of other students had already occurred.

Successful registered nurses, described in Chapter 1, also took the MBTI. Since the Indicator was self-administering, test booklets and answer sheets were given to the nurses and collected personally by the researcher. All necessary directions were given on the cover page of the booklet and there was no time limit.

The participants in this project were given the MEC but with blank Latin Squares instead of the national ratings thus described. The participants were asked to designate their individual preference within the chart correlating type of instructional media with the six parts of "learning" by the marks of high, medium, or low. When these data were collated, the researcher designated number 3 for high, 2 for medium, and 1 for low.

ANALYSIS OF DATA

Null Hypotheses 1 and 4 were accepted or rejected based upon construction of a type table showing distribution and percentage frequencies of subjects by their personality type (Tables 1 and 2). The personality types were of the 16 Jungian Personality Types as determined by the MBTI.

Null Hypotheses 2 and 5 were analyzed by giving the participants a Media Effectiveness Chart with blank Latin Squares with instructions to fill in correlating spaces with their preference for teaching methods, rating them high, medium, or low. In turn, the researcher converted these ratings to numerical scores for the purpose of statistical analysis. High was given the number 3, medium was assigned 2, and low was assigned the number 1. Students and registered nurses were listed individually on the vertical scale and designated by code (personality type and number), while the various media were designated on the horizontal scale. The analysis of variance--one-way classification using the F-score at the 0.05 level of significance--was used in acceptance or rejection of the null hypotheses (Ferguson, 1966) (Tables 2, 3, 21, and 22).

Null Hypotheses 3 and 6 were tested by the analysis of variance--one-way classification using the F-score significant at the .05 level. To test the null hypotheses, a chart was constructed representing each personality type with the number of individuals falling into this type. On the

vertical scale, all personality types with the number of individuals falling into this type were designated by personality type letters. On the horizontal scale, thirteen types of instructional media were placed. All mean scores of each personality type group's preference were placed in each Latin Square. The analysis of variance--one-way classification using the F-score at the .05 level of significance--was used in acceptance or rejection of the null hypotheses (Tables 4, 5, 23, and 24).

Alternative Hypotheses 3 and 6 were measured by using the t-score. Each teaching method was compared to audio recordings, the teaching method ranked lowest among all personality types. For the comparisons of other teaching methods to audio recordings to be significant, the t had to exceed the 1.67 value. The .05 level of significance was used as the basis for rejection of the hypotheses in all cases.

Alternative Hypotheses 3 and 6 were also measured by analyzing the Latin Squares as to personality types and preferred learning styles according to standard deviation at the .05 level of significance. The standard deviation was used to measure the fluctuation in the means of each of the thirteen learning styles associated with personality types.

The z-score was used also as a basis in analyzing personality type learning style preferences. In analyzing these data, the standard deviation of each personality type learning style was multiplied by 1.96, this product was

in turn added to the lowest score of learning style preference. The sum (critical score) obtained provided the significant base level of personality type learning style that would most benefit the individual personality type. In Tables 8 through 19, median ranks were assigned to preferred learning styles by selected nursing students grouped in Jungian Personality Types. In Tables 27 through 34, median ranks were assigned to preferred learning styles by selected registered nurses grouped in Jungian Personality Types. The critical score was used to designate the most effective and the least effective teaching methods for each Jungian Personality Type.

Null Hypothesis 7 compared the data from Table 6, Selected Nursing Students Grouped in Personality Types and Their Preferred Teaching Methods, and the data from Table 25, Selected Successful Registered Nurses Grouped in Personality Types and Their Preferred Teaching Methods. The t-test was used to compare preference for teaching methods of nursing students grouped into personality types with preference for teaching methods of registered nurses grouped into personality types. For the comparisons between students' preferences and registered nurses' preferences to be significant, the t had to exceed the 1.67 value. The .05 level of significance was used as the basis for rejection of the hypothesis (Table 35).

Null Hypothesis 8 was answered by constructing a summary of the distribution and percentage frequencies of the sixteen personality types for student nurses and successful registered nurses (Table 36).

Chapter 4

ANALYSIS OF DATA

The hypotheses tested in this study were as follows:

Null Hypothesis 1 (H_o^1): There are no personality type differences between selected student nurses.

Null Hypothesis 2 (H_o^2): The method of teaching does not have an effect on students' learning.

Null Hypothesis 3 (H_o^3): The personality type of students does not affect the method of teaching (each personality type was measured for significance).

Alternative Hypothesis 3 (H_1^3): Of the personality types of students where teaching method does matter, certain teaching methods are most productive for each personality type.

Null Hypothesis 4 (H_o^4): There are no personality type differences between selected successful registered nurses.

Null Hypothesis 5 (H_o^5): The method of teaching does not have an effect on successful registered nurses' learning.

Null Hypothesis 6 (H_o^6): The personality type of successful registered nurses does not affect the method of teaching (each personality type was measured for significance).

Alternative Hypothesis 6 (H_1^6): Of the personality types of successful registered nurses where teaching method does matter, certain teaching methods are most productive for each personality type.

Null Hypothesis 7 (H_o^7): There is no difference in the personality type learning style comparison between students and successful registered nurses.

Null Hypothesis 8 (H_o^8): There is no difference between the personality types of student nurses and those of registered nurses.

It was hypothesized that there were no differences between the personality types of student nurses and that there were no differences between the personality types of successful registered nurses. It was also hypothesized that teaching method did not have an effect on students' and registered nurses' learning. It was assumed that teaching method was not affected by personality type of students or personality type of registered nurses. Each Jungian personality type of students and registered nurses was analyzed. The method used is described in this chapter. Assuming that the teaching method did matter for certain personality types, each Jungian personality type was analyzed to find the most effective teaching method for each specific personality type. Personality type learning style of students was compared with personality type learning style of successful registered nurses. The data tabulated serve as predictive tools.

Eight hypotheses were stated in the null, meaning it was asserted that no differences existed between the two populations. The steps taken for Hypotheses 2, 3, 5, and 6 were therefore the null hypotheses assumed; that there would be no effect. The data were examined. The question

was asked, what was the probability of obtaining a difference equal to or greater than the one observed in drawing samples at random from populations where the null hypotheses were assumed to be true? If the probability was small, the observed result being highly improbable on the basis of the null hypotheses, preparation was made to reject the null hypotheses. All statistical measurements used in this chapter were based on those presented in Ferguson.

The .05 level of significance was used as the basis for rejection of the hypotheses in all cases. This meant that five cases out of 100 or less could have been incorrectly concluded. In measuring the area of personality, the .05 level of significance was chosen.

F-scores were used as a basis for acceptance or rejection of Hypotheses 2, 3, 5, and 6. F-scores between the method of teaching and individuals' learning, and personality type and method of teaching, were based on "one-way analysis of variance," as outlined in Ferguson, page 292.

Acceptance or rejection of Null Hypotheses 1 and 4 was based upon tabulation of distribution and percentage frequencies of the sixteen Jungian Personality Types of selected nursing students and selected successful registered nurses. These personality types were described in this chapter in Tables 1 and 19.

Alternative Hypotheses 3 and 6 were measured by using the t-score. Each teaching method was compared to audio recordings (the teaching method ranked lowest among all

personality types). For the comparisons of other teaching methods to audio recordings to be significant, the t had to exceed the 1.67 value. The .05 level of significance was used as the basis for rejection of the hypotheses in all cases.

Another way of looking at Alternative Hypotheses 3 and 6 was to base measurement of personality types and learning styles upon standard deviation. Students' and registered nurses' personality types were analyzed with their preferred learning style to obtain the standard deviation for each personality type. The standard deviation was used to measure the fluctuation in the means of each of the thirteen learning styles significant at the .05 level.

The z-score was also used in analyzing personality type learning style preferences at the 1.96 level--area for two standard deviations. In this analysis of data, the standard deviation of each personality type learning style was multiplied by 1.96; this product was in turn added to the lowest score of learning style preference. The sum (critical score) obtained provided the significant base level of learning style that would benefit the Jungian personality type effectively. In Tables 8 through 19, median ranks were assigned to preferred learning styles by selected nursing students grouped in Jungian Personality Types. In Tables 27 through 34, median ranks were assigned to preferred learning styles by selected registered nurses grouped in Jungian Personality Types. The critical score was used to designate

the most and least effective teaching methods for each Jungian Personality Type.

Null Hypothesis 7 compared the data from Table 6, Selected Nursing Students Grouped in Personality Types and Their Preferred Teaching Methods, and the data from Table 25, Selected Successful Registered Nurses Grouped in Personality Types and Their Preferred Teaching Methods. The t-test was used to compare preference for teaching methods of nursing students grouped in personality types with preference for teaching methods of registered nurses grouped in personality types. For the comparisons between students' preferences and registered nurses' preferences to be significant, the t had to exceed the 1.67 value. The .05 level of significance was used as the basis for rejection of the hypothesis (Table 35).

Null Hypothesis 8 was answered by constructing a summary of the distribution and percentage frequencies of the sixteen personality types for student nurses and successful registered nurses (Table 36).

ANALYSIS OF THE HYPOTHESES

Null Hypothesis 1 (H_o^1): There are no personality type differences between selected student nurses.

Data for this hypothesis are tabulated in Table 1. From Table 1 it could be seen that the 43 selected nursing students were distributed in 13 of the 16 Latin Squares on the type table with 8 of the 43 subjects classified in the

square ESFJ. The dominant process that unifies the life of the ESFJ is feeling.

Table 1. Distribution and Percentage Frequencies of Selected Nursing Students According to Personality Type (N = 43)

	ISTJ		ISFJ		INFJ		INTJ
#1	2.3%	#6	13.9%	#2	4.6%	#1	2.3%
	ISTP		ISFP		INFP		INTP
#0	0%	#4	9.3%	#5	11.6%	#0	0%
	ESTP		ESFP		ENFP		ENTP
#2	4.6%	#6	13.9%	#3	6.9%	#1	2.3%
	ESTJ		ESFJ		ENFJ		ENTJ
#2	4.6%	#8	18.6%	#3	6.9%	#0	0%

> Feeling is boss, there is no argument with it. In any conflict with other processes, his feeling has the final word. His life will be shaped to serve his feeling values. He will pay attention to his perception, his sensing, only when it is in accord with his feeling. Even then, he will respect it only to a degree, depending on how well he has developed it. He will not permit his sensing to point out disturbing facts about something valued by his feeling (Myers-Briggs, 1962).

> An ESFJ is practical, realistic, matter-of-fact, concerned with here and now. He is interested in material possessions and details of direct experience. He likes to base plans, decisions, etc., upon known facts, and usually adapts excellently to routine (Myers-Briggs, 1962).

The squares with the second largest number of student nurses were ISFJ and ESFP. The ISFJ, being an introvert, has his

> . . . dominant process engrossed with his inner world of concepts and ideas. His auxiliary process does what it can about his outer life, which is thrust upon him

whether he wants one or not.

This combination makes him the super dependable. He has complete, realistic, practical respect for the facts. He likes everything put on a factual basis, clearly stated, and not too unfamiliar or complex. He mildly resembles an extroverted feeling type. He has tact, sympathy, interest in people and concern for their feelings (Myers-Briggs, 1962).

The ESFP

. . . puts sensing in charge and his feeling in second place. This combination makes the adaptable realist, who good-naturedly accepts and uses the facts around him, whatever they are. He knows what goes on, who wants what, who doesn't and usually why. He does not fight these facts. Often he can get other people to adapt too. Thus, he may be good at easing a tense situation and pulling conflicting factions together. He has interest in people, and uses tact and sympathy with their feelings (Myers-Briggs, 1962).

The square having the third largest number of types of student nurses was INFP.

The INFP sees the possibilities. He mildly resembles an extroverted intuitive, particularly in liking to concentrate on a project and disliking all details not relevant to any deep interest. He is likely to have a gift of expression, especially in writing (Myers-Briggs, 1962).

Four individuals were classified in the square ISFP.

The SF people rely primarily on sensing for purposes of perception, but prefer feeling for purposes of judgment. They are mainly interested in facts that they can gather directly through the senses. They approach their decisions regarding these facts with personal warmth, because they trust feeling, with its valuations in terms of how much things matter to themselves and others (Myers-Briggs, 1962).

Two squares contained three individuals, ENFJ and ENFP. The ENFJ

. . . is concerned chiefly with people. He radiates fellowship, valuing harmonious human contacts above all things. He sees the possibilities and has curiosity for new ideas as such, insight, vision, and concern for future possibilities. Being interested in books and theory, he may have a gift for expression.

> The ENFP is the enthusiastic innovator, always seeing new possibilities--new ways of doing things and goes all out in pursuit of them. He has a lot of imagination and initiative for originating projects, and a lot of impulsive energy for carrying them out. He has remarkable insight into people and their possibilities (Myers-Briggs, 1962).

Two subjects were classified into each of the squares of INFJ, ESTP, and ESTJ. The INFJ is

> . . . the outstanding innovator in the field of ideas, principles, and systems of thought; the ESTP finds it easy to master the mathematical or theoretical side of things; the ESTJ is matter of fact, practical, and concerned with the here and now (Myers-Briggs, 1962).

Three squares contained one individual each. They were ISTJ, INTJ, and ENTP. There were no student nurses with the personality types of ISTP, INTP, and ENTJ.

These data indicated an uneven distribution of personality types among the 43 selected student nurses. Four squares contained 55.7 percent of the student nurses' sample. Three of the 16 squares had only one subject, while another three squares contained only two individuals each. These data showed a predominant number of Sensing-Feeling types.

Analysis of data for Null Hypothesis 1 indicated that there were personality type differences between selected student nurses and, therefore, Null Hypothesis 1 (H_o^1) is rejected. The accepted hypothesis would be:

> There are personality type differences between selected student nurses.

Null Hypothesis 2 (H_o^2): The method of teaching does not have an effect on students' learning.

The hypothesis was analyzed by giving the student nurses a Media Effectiveness Chart with blank Latin Squares. Students scored their preference for teaching methods by ratings of high, medium, or low. These ratings were converted to numerical scores. High was given 3 points, medium was given 2 points, and low was given 1 point. Data for this hypothesis were tabulated in Tables 2 and 3. Analysis of data for Null Hypothesis 2 indicated that there was a significant difference in the nursing students' learning and the method of teaching. The F-score was 7.41, which exceeded the critical .05 level F-score of 1.78 for 558 degrees of freedom.

Table 2 illustrates computation for the analysis of variance: one-way classification for selected individual nursing students' preferences for teaching methods. Student nurses were divided into 43 separate spaces along the vertical side of the chart, coded by their four-letter personality type and designated number. The horizontal scale was divided into 13 methods of teaching represented on the MEC. The Latin Squares were numerically scored according to the preferences of the student nurses.

The vertical columns were tabulated as follows: The sums of the squares were calculated and represented by the letters T_j. The sums of numbers in the individual columns were represented by the same column's n_j to give the value of $\bar{X}_j$, the mean of the total scores in the column.

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Size of type used for Table 2 in the original document was too small to film adequately.

Table 2 (Continued)

SUM OF SQUARES				
Between	90715.85	- 89823.60	=	892.25
Within	96193	- 90715.85	=	5477.15
Total	96193	- 89823.60	=	6369.4

Next, $\sum_{i=1}^{n_j} Xi_j^2$ was obtained by squaring each number in each column, then adding each individual column's squares together. $\frac{T_j^2}{n_j}$ for each column was then computed by squaring each T_j and dividing that number by n_j.

The horizontal lines were computed across the chart in the following manner. N was tabulated by adding all n_j numbers across the chart. T was tabulated by totaling the T_j numbers across the chart. T^2/N was tabulated by squaring T and dividing that number by N. $\sum_{j=1}^{k} \sum_{i=1}^{n_j} Xi_j^2$ was obtained by adding all of the numbers representing $\sum_{i=1}^{n_j} Xi_j^2$ across the chart. Finally, $\sum_{j=1}^{k} \frac{T_j^2}{n_j}$ was tabulated by adding the $\frac{T_j^2}{n_j}$ numbers across the horizontal scale.

Table 3 illustrated the way the data from Table 2 were manipulated to obtain the final F-score. It was explained here: The Sum of squares Between score was obtained by

finding the difference between $\sum_{j=1}^{k} \frac{T_j^2}{n_j}$ and T^2/n_j. The answer was 892.25. The Sum of squares Within score was obtained by finding the differences between $\sum_{j=1}^{k} \sum_{i=1}^{n_j} Xi_j$ and $\sum_{J=1}^{k} \frac{T_j^2}{n_j}$. The Sum of squares Total score was obtained by finding the difference between $\sum_{j=1}^{k} T_j^2$ and T^2/N.

Table 3. Analysis of Variance for Data of Table 2, Selected Individual Nursing Students' Preferences for Teaching Methods

Source of Variation	Sum of Squares	Degrees of freedom	Variance estimate
Between	892.25	12	$74.35 = s_b^2$
Within	5477.15	546	$10.03 = s_w^2$
Total	6369.4	558	$F = 7.41$

$F = 7.41$

The number of groups was 13. The number of degrees of freedom associated with the between group's sum of squares formula was k-1 or, in this case, 13-1 = 12. The number of degrees of freedom associated with the within group's sum of squares formula was N-k or, in this case, the total number of

Latin Squares minus the number of groups = 559 - 13 = 546. The number of degrees of freedom associated with the total was found by using the formula N - 1 or, in this case, 559 - 1 = 558. The between and within sums of squares were divided by the associated degrees of freedom to obtain the variance estimates s_b^2 and s_w^2

The F-ratio is s_b^2/s_w^2 = 74.35/10.03 = 7.41. Consulting a table of F with df = 12 associated with the numerator and 546 associated with the denominator, the value of F was found to be 1.78 at the .05 level of significance.

The calculated F-value was 7.41 and, therefore, Null Hypothesis 2 (H_o^2) is rejected. The accepted hypothesis would be:

> The method of teaching does have an effect on students' learning.

Null Hypothesis 3 (H_o^3): The personality type of students does not affect the method of teaching (each personality type was measured for significance).

Statistical basis for this hypothesis is shown in Tables 4 and 5. To test the null hypothesis, a chart was constructed representing each Jungian personality type with the number of individuals falling into each type. Median scores of each personality type's preference for method of teaching were placed in each Latin Square (Table 4).

Analysis of data for Null Hypothesis 3 indicated that there was a significant difference in the personality type's

Table 4. Analysis of Variance for Data of Null Hypothesis 3, Selected Nursing Students Grouped in Personality Types and Their Preference for Teaching Methods

	Lecture	Discussion	Small Group Work	Audio Recordings	Readings (Texts, Articles)	Programmed Instruction	Tutorial	Symbols (Maps, Charts, Diagrams)	Pictures, Slides	Motion Pictures, TV	Field Trips	Demonstrations, Role Playing	Laboratory Work	
ISFJ(6)	12.6	13.2	13.2	9.3	13	12.3	12.8	12	12.8	12.3	13.7	8.5	11	
ISTJ(1)	14	12	12	10	15	16	12	12	10	7	9	12	14	
ISFP(4)	15.5	14.5	15	9	11.5	12.5	11.5	14.5	14.2	13.8	15.8	13.3	13.8	
INFP(5)	14.8	15.2	14.2	8.2	13.8	12.4	12	13.2	11.8	9	12	11	12	
INFJ(2)	14	14	13.5	13	14.5	14	17	13	16.5	15	16	16	15	
ESTP(2)	10.5	11.5	12.5	8.5	10	9	12	12.5	12	14.5	12	14.5	13	
ESTJ(2)	17	9	12.5	6.5	17.5	12.5	6.5	11.5	10.5	14	9.5	7.5	9.5	
ESFP(6)	16.7	16.2	12.8	8.7	14	8.7	8.7	10.5	10.8	13.2	13	13.2	13.2	
ESFJ(8)	13.5	12.1	13	9.1	13.4	13.4	14.1	11.9	11.9	13.7	12.4	12.3	13.8	
ENFP(3)	15.7	12	12.7	6	14	14	15.7	11.3	14.3	13.7	11.7	12.3	12.3	
ENFJ(3)	14.3	12.7	16.3	12.7	17	13	15.7	14	14	14	17	15.7	12.7	
ENTP(1)	8	15	18	6	16	11	6	12	13	13	8	0	14	
n_j	12	12	12	12	12	12	12	12	12	12	12	12	12	$N = 156$
T_j	166.6	157.4	155.7	107	169.7	119.8	130.5	136.4	148.5	139.5	150.1	136.3	154.3	$T = 1871.8$
$\bar{X}_j = \frac{T_j}{n_j}$	13.8	13.1	12.9	8.9	14.1	9.9	10.8	11.3	12.3	11.6	12.5	11.3	12.8	$\frac{T^2}{N} = 24495.2$
$\sum_{i=1}^{n_j} X i_j^2$	2369.8	2110	2323	909.6	2449.5	1729.8	1862.4	1849.2	1548.8	2017.2	1964.9	1759.4	1201.6	$\sum_{j=1}^{k} \sum_{i=1}^{n_j} X i_j = 24495.2$
$\frac{T_j^2}{n_j}$	2312	2064	2020.2	954.0	2399.8	1196.0	1419.1	1550.4	1837.6	1621.6	1877.5	1548.1	1984.0	$\sum_{j=1}^{k} \frac{T_j^2}{n_j} = 292.11$

SUM OF SQUARES

Between	292.11 - 22459.2 = 22167.09
Within	24495.2 - 292.11 = 24203.09
Total	24495.2 - 22459.2 = 2036

learning and the method of teaching. The F-score was 2.20, which exceeded the critical .05 level F-score of 1.85 for 155 degrees of freedom.

Illustrated in Table 4 is the computation for the analysis of variance; one-way classification for selected nursing students grouped into personality types and their preferences for learning and teaching methods. Student nurses were grouped into personality types and the number of students falling into each type was coded by the four-letter personality type on the vertical scale of the table. The horizontal scale was divided into 13 teaching methods, as represented on the MEC. The Latin Squares were scored according to the means of collective student preferences for each teaching method.

The vertical columns were tabulated as explained for Null Hypothesis 2. The horizontal lines were also computed according to the same formula described for Null Hypothesis 2, Table 2. The Sum of squares Between score and the Sum of squares Within score as well as the Sum of squares Total score were obtained by the same formulas as described for Null Hypothesis 2, Table 3.

The number of groups was 12. The number of degrees of freedom associated with the between-groups sum of squares formula was k - 1 or, in this case, 12 - 1 = 11. The number of degrees of freedom associated with the within groups sum of squares formula was N - k or, in this case, the total of Latin Squares minus the number of groups, 156 - 12 = 144.

The number of degrees of freedom associated with the total was found by using the formula n - 1 or, in this case, 156 - 1 = 155. The between and within sums of squares were divided by the associated degrees of freedom to obtain the variance estimates s_b^2 and s_w^2.

Table 5. Analysis of Variance for Data of Table 3

Source of Variation	Sum of Squares	Degrees of freedom	Variance estimate
Between	22167.09	12	$184.67 = s_b^2$
Within	24203.09	143	$85.85 = s_w^2$
Total	46370.18	155	F = 2.20

F = 2.20

The F-ratio is $s_b^2/s_w^2 = 184.67/83.85 = 2.20$. Consulting a table of F (Ferguson, 1966) with df = 11 associated with the numerator and 144 associated with the denominator, the value of F was found to be 1.85 at the .05 level of significance, and therefore Null Hypothesis 3 (H_o^3) is rejected. The accepted hypothesis would be:

> The personality type of students does affect the method of teaching.

Alternative Hypothesis 3 (H_1^3): Of the personality types of students where teaching method does matter, certain teaching methods are most productive for each personality type.

Statistical support for this hypothesis is shown in Tables 6 through 19. To test the Alternative Hypothesis 3, a

chart was constructed representing each personality type and the number of individuals falling into this type and their preference for teaching method (Table 4).

In Table 4, data revealed that audio recordings scored a T_j of 107. Audio recordings' T_j score was the lowest of all teaching methods. Audio recordings, compared to other T_j scores of teaching methods, were as follows: lecture 166.6, discussion 157.4, small group work 155.7, readings (texts, articles) 169.7, programmed instruction 119.8, tutorial 130.5, symbols (maps, diagrams, charts) 136.4, pictures/slides 148.5, motion pictures/TV 139.5, field trips 150.1, demonstrations/role playing 136.3, and laboratory work 154.3. From these data it was seen that undoubtedly audio recording was the lowest of students' preferred teaching and learning methods. Therefore all other teaching methods were compared to audio recordings (Table 6) to determine if each of the other methods was significantly more effective for each of the personality types.

Analysis of data for Alternative Hypothesis 3 indicated that there was a significant difference in the teaching methods used for personality types. The t-scores for each teaching method ranged from 8.10 to 4.31, which exceeded the critical .05 level t-score of 1.67 for 82 degrees of freedom. The t-score range for each teaching method was as follows: lecture 8.10, discussion 7.86, small group work 7.72, laboratory work 7.67, readings 6.80, motion pictures/TV 6.45, pictures/slides 5.95, field trips 5.80, symbols (charts,

diagrams, maps) 5.10, demonstrations/role playing 4.65, tutorial 4.57, and programmed instruction 4.31.

Table 6. Preferred Teaching Methods of Selected Student Nurses Grouped in Personality Types

Comparison of Audio with other Teaching Methods	Degrees of Freedom	t Critical Value	t Obtained	Accepted or Rejected
Audio-Lecture	82	1.67	8.10	Accepted
Audio-Discussion	82	1.67	7.86	Accepted
Audio-Small Group Work	82	1.67	7.72	Accepted
Audio-Laboratory	82	1.67	7.67	Accepted
Audio-Readings	82	1.67	6.80	Accepted
Audio-Movie	82	1.67	6.45	Accepted
Audio-Slides	82	1.67	5.95	Accepted
Audio-Field Trip	82	1.67	5.80	Accepted
Audio-Symbols	82	1.67	5.10	Accepted
Audio-Demonstration	82	1.67	4.65	Accepted
Audio-Tutorial	82	1.67	4.57	Accepted
Audio-Programmed	82	1.67	4.31	Accepted

Another way of looking at Alternative Hypothesis 3 was to base measurement of personality types and learning styles upon standard deviation (Table 7). The median scores of students' preferences for teaching methods were placed in the Latin Squares. The standard deviation was derived for each personality type, measuring the fluctuation in the means of each of the 13 learning styles significant at the .05 level.

In turn, z-scores were used (Table 7). The standard deviation for each personality type was multiplied by 1.96

Table 7. Standard Deviations of the Means and Critical Values (z-Scores), Personality Types of Selected Student Nurses and Their Preferred Method of Teaching

	Lecture	Discussion	Small Group Work	Audio Recording	Readings (Texts, Articles)	Programmed Instruction	Tutorial	Symbols (Maps, Charts, Diagrams)	Pictures, Slides	Motion Pictures, TV	Field Trips	Demonstrations, Role Playing	Laboratory Work	Standard Deviations of the Means	z-Score Critical Values
ISFJ	12.6	13.2	13.2	9.3	13	12.3	12.8	12	12.8	12.3	13.7	8.5	11	1.557	11.59
ISTJ	14	12	12	10	15	16	12	12	10	7	9	12	14	3.236	13.330
ISFP	15.5	14.5	15	9	11.5	12.5	11.5	14.5	14.2	13.8	15.8	13.3	13.8	1.903	12.724
INFP	14.8	15.2	14.2	8.2	13.8	12.4	12	13.2	11.8	9	12	11	12	2.066	12.249
INFJ	14	14	13.5	13	14.5	14	17	13	16.5	15	16	16	15	1.316	15.567
ESTP	10.5	11.5	12.5	8.5	10	9	12	12.5	12	14.5	12	14.5	13	1.844	12.114
ESTJ	17	9	12.5	6.5	17.5	12.5	6.5	11.5	10.5	14	9.5	7.5	9.5	3.575	13.497
ESFP	16.7	16.2	12.8	8.7	14	8.7	8.7	10.5	10.8	13.2	13	13.2	13.2	2.661	13.913
ESFJ	13.5	12.1	13	9.1	13.4	13.4	14.1	11.9	11.9	13.7	12.4	12.3	13.8	1.313	11.673
ENFP	15.7	12	12.7	6	14	14	15.7	11.3	14.3	13.7	11.7	12.3	12.3	2.476	10.852
ENFJ	14.3	12.7	16.3	12.7	17	13	15.7	14	14	14	17	15.7	12.7	1.616	15.867
ENTP	8	15	18	6	16	11	6	12	13	13	8	0	14	4.969	15.739

(two standard deviations). The product from this equation was added to the lowest score of learning style preference. The z-score (critical score) obtained provided the significant base level of personality type learning style that would most benefit the Jungian personality. The z-scores obtained were all significant at the .05 level. The z-score was significant for all personality types for some of the teaching methods. This was also explained by the data tabulated in Tables 8 through 19.

In Tables 8 through 19, median ranks were assigned to preferred learning styles as previously tabulated in the Latin Squares (Table 7). The critical score (z-score) was then used to denote the point of critical value, the line of demarcation for most and least effective methods of instruction. The methods of preferred learning styles were ranked according to the degree of effectiveness, with the number at the top of the column representing the most effective method and the number at the bottom of the column representing the least effective method. In all personality types there were some teaching methods that exceeded the z-score significant at the .05 level and therefore Alternative Hypothesis 3 (H_1^3) is accepted. The accepted hypothesis would be:

> Of the personality types of students where teaching method does matter, certain teaching methods are most productive for each personality type.

Analysis of Alternative Hypothesis 3 by individual Jungian personality types showed that a different teaching method was most effective and least effective for each specific Jungian personality type. According to data presented in Table 8, the nursing student with the personality type ISFJ would learn most effectively by field trips. The ISFJ would learn least effectively by laboratory work, audio recordings, and demonstrations/role playing. According to the data, the ISFJ could also learn effectively from discussion, small group work, readings, pictures/slides, tutorial, lecture, motion pictures/TV, programmed instruction, and symbols (maps, charts, and diagrams). These data did not indicate that symbols would be a significantly more effective method of teaching than laboratory. However, in 95 cases out of 100 it would be anticipated that the methods above the line of critical value would be significantly more effective than the methods below the line of critical value for the nursing student with the personality type ISFJ.

Table 9 showed that the student nurse with the personality type ISTJ would learn most effectively by programmed instruction. The ISTJ would also learn effectively by readings, laboratory work, and lecture, in that order. He would learn least effectively by audio recordings, field trips, and motion pictures. The list of ineffective methods of learning for the ISTJ was more numerous than the list of effective teaching methods. Other ineffective methods of

Table 8. Median Ranks Assigned to Preferred Learning Styles by Selected Student Nurses with the Jungian Personality Type ISFJ[a]

Learning Style	Mean of Latin Squares	Standard Deviation	Critical Value
Field trips	13.7	1.557	11.59
Discussion	13.2	1.557	11.59
Small Group Work	13.2	1.557	11.59
Readings (texts, articles)	13.0	1.557	11.59
Pictures/Slides	12.8	1.557	11.59
Tutorial	12.8	1.557	11.59
Lecture	12.6	1.557	11.59
Motion pictures/TV	12.3	1.557	11.59
Programmed instruction	12.3	1.557	11.59
Symbols (maps, charts, diagrams)	12.0	1.557	11.59
	____*		
Laboratory work	11.0	1.557	11.59
Audio recordings	9.3	1.557	11.59
Demonstrations/Role playing	8.5	1.557	11.59

*____ denotes point of critical value.

[a]Numbers represent degrees of effectiveness.

13.7 = most effective.

8.5 = least effective.

Table 9. Median Ranks Assigned to Preferred Learning Styles by Selected Student Nurses with the Jungian Personality Type ISTJ[a]

Learning Style	Mean of Latin Squares	Standard Deviation	Critical Value
Programmed instruction	16	3.236	13.330
Readings (texts, articles)	15	3.236	13.330
Laboratory work	14	3.236	13.330
Lecture	14	3.236	13.330
	____*		
Discussion	12	3.236	13.330
Small group work	12	3.236	13.330
Tutorial	12	3.236	13.330
Symbols (maps, charts, diagrams)	12	3.236	13.330
Demonstrations/Role playing	12	3.236	13.330
Pictures/Slides	10	3.236	13.330
Audio recordings	10	3.236	13.330
Field trips	9	3.236	13.330
Motion pictures/TV	7	3.236	13.330

*____ denotes point of critical value.

[a]Numbers represent degrees of effectiveness.

16 = most effective.

7 = least effective.

learning for this personality type were discussion, small group work, tutorial, symbols, demonstrations/role playing, and pictures/slides. It was not clear from these data whether lecture would be greatly more effective for the ISTJ than would be discussion. The methods above the line of critical value would be significantly more effective for the ISTJ than those falling below it.

Table 10 indicated that the student nurse with the personality type ISFP would learn most effectively by field trips and least effectively by audio recordings. Without a doubt, the ISFP should not be expected to learn effectively by audio recordings. Lecture, small group work, discussion, symbols, pictures/slides, laboratory work, motion pictures/TV and demonstrations/role playing were methods that would be expected to aid the ISFP in learning effectively. Other methods falling below the line of critical value were programmed instruction, readings, and tutorial, and these should not be used with the ISFP to promote effective learning.

The Jungian personality type of INFP for student nurses indicated a strong preference for learning effectively from discussion. The INFP would also learn by lecture, small group work, readings, symbols, and programmed instruction, in that order. The most ineffective method of learning for the INFP would be audio recordings. Tutorial, field trips, laboratory work, pictures/slides, demonstrations/role playing, and motion pictures/TV were also ineffective methods of

Table 10. Median Ranks Assigned to Preferred Learning Styles by Selected Student Nurses with the Jungian Personality Type ISFP[a]

Learning Style	Mean of Latin Squares	Standard Deviation	Critical Value
Field trips	15.8	1.903	12.724
Lecture	15.5	1.903	12.724
Small group work	15	1.903	12.724
Discussion	14.5	1.903	12.724
Symbols (maps, charts, diagrams)	14.5	1.903	12.724
Pictures/Slides	14.2	1.903	12.724
Laboratory work	13.8	1.903	12.724
Motion pictures/TV	13.8	1.903	12.724
Demonstrations/Role playing	13.3	1.903	12.724
	____*		
Programmed instruction	12.5	1.903	12.724
Readings (texts, articles)	11.5	1.903	12.724
Tutorial	11.5	1.903	12.724
Audio recordings	9	1.903	12.724

*____ denotes point of critical value.

[a]Numbers represent degrees of effectiveness.
15.8 = most effective.
9 = least effective.

learning for the student nurse with the personality type of INFP. The teaching methods found above the line of critical value would be significantly more effective methods of learning for the INFP than those found below it (Table 11).

Table 12 indicated that, for the student nurse with the personality type INFJ, the best method of teaching was tutorial. Pictures/slides, field trips, and demonstrations/role playing were also effective methods, in that order. The student nurse with the personality type INFJ would not profit from audio recordings. Neither would this type be expected to learn well by laboratory work, motion pictures/TV, readings, lectures, discussion, programmed instruction, small group work, or symbols. The teaching methods just illustrated fell below the line of critical value and therefore would not be used for the student nurse with personality type INFJ to promote effective learning.

Effective learning for the student nurse with personality type ESTP would best be achieved by using demonstrations/role playing. Table 13 illustrated that motion pictures/TV, laboratory work, symbols, and small group work were also effective teaching methods for the ESTP. In 95 cases out of 100 these methods would be most effective. The least effective method of teaching for the ESTP would be audio recordings, which fell at the bottom of the list. Other methods ineffective for the student nurse with personality type ESTP, and which fall below the line of

Table 11. Median Ranks Assigned to Preferred Learning Styles by Selected Student Nurses with the Jungian Personality Type INFP[a]

Learning Style	Mean of Latin Squares	Standard Deviation	Critical Value
Discussion	15.2	2.066	12.249
Lecture	14.8	2.066	12.249
Small group work	14.2	2.066	12.249
Readings (texts, articles)	13.8	2.066	12.249
Symbols (maps, charts, diagrams)	13.2	2.066	12.249
Programmed instruction	12.4	2.066	12.249
	____*		
Tutorial	12	2.066	12.249
Field trips	12	2.066	12.249
Laboratory work	12	2.066	12.249
Pictures/Slides	11.8	2.066	12.249
Demonstrations/Role playing	11	2.066	12.249
Motion pictures/TV	9	2.066	12.249
Audio recordings	8.2	2.066	12.249

*____ denotes point of critical value.

[a]Numbers represent degrees of effectiveness.

15.2 = most effective.

8.2 = least effective.

Table 12. Median Ranks Assigned to Preferred Learning Styles by Selected Student Nurses with the Jungian Personality Type INFJ[a]

Learning Style	Mean of Latin Squares	Standard Deviation	Critical Value
Tutorial	17	1.316	15.567
Pictures/Slides	16.5	1.316	15.567
Field trips	16	1.316	15.567
Demonstrations/Role playing	16	1.316	15.567
	____*		
Laboratory	15	1.316	15.567
Motion pictures/TV	15	1.316	15.567
Readings (texts, articles)	14.5	1.316	15.567
Lecture	14	1.316	15.567
Discussion	14	1.316	15.567
Programmed instruction	14	1.316	15.567
Small group work	13.5	1.316	15.567
Symbols (maps, charts, diagrams)	13	1.316	15.567
Audio recordings	13	1.316	15.567

*____ denotes point of critical value.

[a]Numbers represent degrees of effectiveness.

17 = most effective.

13 = least effective.

Table 13. Median Ranks Assigned to Preferred Learning Styles by Selected Student Nurses with the Jungian Personality Type ESTP[a]

Learning Style	Mean of Latin Squares	Standard Deviation	Critical Value
Demonstrations/Role playing	14.5	1.844	12.114
Motion pictures/TV	14.5	1.844	12.114
Laboratory	13	1.844	12.114
Symbols (maps, charts, diagrams)	12.5	1.844	12.114
Small group work	12.5	1.844	12.114
	____*		
Field trips	12	1.844	12.114
Tutorial	12	1.844	12.114
Pictures/Slides	12	1.844	12.114
Discussion	11.5	1.844	12.114
Lecture	10.5	1.844	12.114
Readings (texts, articles)	10	1.844	12.114
Programmed instruction	9	1.844	12.114
Audio recordings	8.5	1.844	12.114

*____ denotes point of critical value.

[a]Numbers represent degrees of effectiveness.

14.5 = most effective.

8.5 = least effective.

critical value, were field trips, tutorial, pictures/slides, discussion, lectures, readings, and programmed instruction. It could not be discerned from these data whether small group work would be significantly more effective as a teaching method than field trips.

The student nurse with Jungian personality type ESTJ indicated a strong preference for learning by readings. Lecture and motion pictures/TV were two additional methods that would be beneficial to the ESTJ. Audio recordings would be the least effective method of teaching. The list of ineffective methods of learning for the ESTJ was longer than the list of effective teaching methods. Ineffective methods of learning for the ESTJ would be tutorial, demonstrations/role playing, discussion, laboratory, field trips, pictures/slides, symbols, small group work, and programmed instruction (Table 14).

Table 15 indicated that the student nurse with personality type ESFP would learn best by lecture, discussion, and readings, in that order. Teaching methods falling below the line of critical value indicated that audio recordings were the least effective method of teaching, along with programmed instruction and tutorial. Other methods that would not be conducive to effective learning for the ESFP would be symbols, pictures/slides, small group work, field trips, laboratory, demonstrations/role playing, and motion pictures/TV. It was not shown from these data whether reading would be a significantly more effective method of

Table 14. Median Ranks Assigned to Preferred Learning Styles by Selected Student Nurses with the Jungian Personality Type ESTJ[a]

Learning Style	Mean of Latin Squares	Standard Deviation	Critical Value
Readings (texts, articles)	17.5	3.575	13.497
Lecture	17	3.575	13.497
Motion pictures/TV	14	3.575	13.497
	____*		
Programmed instruction	12.5	3.575	13.497
Small group work	12.5	3.575	13.497
Symbols (maps, charts, diagrams)	11.5	3.575	13.497
Pictures/Slides	10.5	3.575	13.497
Field trips	9.5	3.575	13.497
Laboratory	9.5	3.575	13.497
Discussion	9	3.575	13.497
Demonstrations/Role playing	7.5	3.575	13.497
Tutorial	6.5	3.575	13.497
Audio recordings	6.5	3.575	13.497

*____ denotes point of critical value.

[a]Numbers represent degrees of effectiveness.

17.5 = most effective.

8.5 = least effective.

Table 15. Median Ranks Assigned to Preferred Learning Styles by Selected Student Nurses with the Jungian Personality Type ESFP[a]

Learning Style	Mean of Latin Squares	Standard Deviation	Critical Value
Lecture	16.7	2.661	13.913
Discussion	16.2	2.661	13.913
Readings (texts, articles)	14	2.661	13.913
	____*		
Motion pictures/TV	13.2	2.661	13.913
Demonstrations/Role playing	13.2	2.661	13.913
Laboratory	13.2	2.661	13.913
Field trips	13	2.661	13.913
Small group work	12.8	2.661	13.913
Pictures/Slides	10.8	2.661	13.913
Symbols (maps, charts, diagrams)	10.5	2.661	13.913
Tutorial	8.7	2.661	13.913
Programmed instruction	8.7	2.661	13.913
Audio recordings	8.7	2.661	13.913

*____ denotes point of critical value.

[a]Numbers represent degrees of effectiveness.

16.7 = most effective.

8.7 = least effective.

teaching than motion pictures/TV.

Table 16 indicated that tutorial was the most effective method of teaching for the student nurse with Jungian personality type ESFJ. Nine other effective methods of learning above the line of critical value would be laboratory, motion pictures/TV, lecture, programmed instruction, readings, small group work, field trips, demonstrations/role playing, and discussion. Again, audio recordings were the least effective method of learning. Symbols and pictures/slides were also ineffective methods of teaching below the line of critical value for the student with personality type ESFJ. While tutorial was greatly more effective than audio recordings, it was not shown by these data whether discussion would be significantly more effective than pictures/slides as a teaching method for the ESFJ.

The student nurse with personality type ENFP found all types of learning methods effective with the exception of audio recordings. Audio recordings was the only ineffective method of teaching for the student nurse with personality type ENFP. Lecture and tutorial were stated to be the most effective methods of learning with other effective methods ranked in the following order: pictures/slides, readings, programmed instruction, motion pictures/TV, small group work, demonstrations/role playing, laboratory, discussion, field trips, and symbols. All methods of teaching were significantly effective for the student nurse

Table 16. Median Ranks Assigned to Preferred Learning Styles by Selected Student Nurses with the Jungian Personality Type ESFJ[a]

Learning Style	Mean of Latin Squares	Standard Deviation	Critical Value
Tutorial	14.1	1.844	12.114
Laboratory	13.8	1.844	12.114
Motion pictures/TV	13.7	1.844	12.114
Lecture	13.5	1.844	12.114
Programmed instruction	13.4	1.844	12.114
Readings (texts, articles)	13.4	1.844	12.114
Small group work	13	1.844	12.114
Field trips	12.4	1.844	12.114
Demonstrations/Role playing	12.3	1.844	12.114
Discussion	12.1	1.844	12.114
	____*		
Pictures/Slides	11.9	1.844	12.114
Symbols (maps, charts, diagrams)	11.9	1.844	12.114
Audio recordings	9.1	1.844	12.114

*____ denotes point of critical value.

[a]Numbers represent degrees of effectiveness.

14.1 = most effective.

9.1 = least effective.

with personality type ENFP, with the exception of audio recordings (Table 17).

Table 18 indicated that the student nurse with personality type ENFJ would learn best by readings, field trips, and small group work, in that order. Teaching methods below the line of critical value indicated that audio recordings were the least effective method of teaching, along with discussion and laboratory. Other methods not conducive to effective learning for the ENFJ were programmed instruction, motion pictures/TV, pictures/slides, symbols, lecture, tutorial, and demonstrations/role playing, in that order. It was not shown from these data whether small group work would be significantly more effective than demonstrations/role playing.

The student nurse with Jungian personality type ENTP indicated a strong preference for learning by small group work. Another very effective method of teaching was readings. All other teaching methods were below the line of critical value and therefore were found to be ineffective for the ENTP. Ineffective methods of learning for the ENTP would be demonstrations/role playing, audio recordings, tutorial, lecture, field trips, programmed instruction, symbols, pictures/slides, motion pictures/TV, laboratory, and discussion (Table 19).

Table 17. Median Ranks Assigned to Preferred Learning Styles by Selected Student Nurses with the Jungian Personality Type ENFP[a]

Learning Style	Mean of Latin Squares	Standard Deviation	Critical Value
Lecture	15.7	2.476	10.852
Tutorial	15.7	2.476	10.852
Pictures/Slides	14.3	2.476	10.852
Readings (texts, articles)	14	2.476	10.852
Programmed instruction	14	2.476	10.852
Motion pictures/TV	13.7	2.476	10.852
Small group work	12.7	2.476	10.852
Demonstrations/Role playing	12.3	2.476	10.852
Laboratory	12.3	2.476	10.852
Discussion	12	2.476	10.852
Field trips	11.7	2.476	10.852
Symbols (maps, charts, diagrams)	11.3	2.476	10.852
	____*		
Audio recordings	6	2.476	10.852

*____ denotes point of critical value.

[a]Numbers represent degrees of effectiveness.

15.7 = most effective.

6 = least effective.

Table 18. Median Ranks Assigned to Preferred Learning Styles by Selected Student Nurses with the Jungian Personality Type ENFJ[a]

Learning Style	Mean of Latin Squares	Standard Deviation	Critical Value
Readings (texts, articles)	17	1.616	15.867
Field trips	17	1.616	15.867
Small group work	16.3 ____*	1.616	15.867
Demonstrations/Role playing	15.7	1.616	15.867
Tutorial	15.7	1.616	15.867
Lecture	14.3	1.616	15.867
Symbols (maps, charts, diagrams)	14	1.616	15.867
Pictures/Slides	14	1.616	15.867
Motion pictures/TV	14	1.616	15.867
Programmed instruction	13	1.616	15.867
Laboratory	12.7	1.616	15.867
Discussion	12.7	1.616	15.867
Audio recordings	12.7	1.616	15.867

*____ denotes point of critical value.

[a]Numbers represent degrees of effectiveness.

17 = most effective.

12.7 = least effective.

Table 19. Median Ranks Assigned to Preferred Learning Styles by Selected Student Nurses with the Jungian Personality Type ENTP[a]

Learning Style	Mean of Latin Squares	Standard Deviation	Critical Value
Small group work	18	4.969	15.739
Readings (texts, articles)	16	4.969	15.739
	____*		
Discussion	15	4.969	15.739
Laboratory	14	4.969	15.739
Motion pictures/TV	13	4.969	15.739
Pictures/Slides	13	4.969	15.739
Symbols (maps, charts, diagrams)	12	4.969	15.739
Programmed instruction	11	4.969	15.739
Field trips	8	4.969	15.739
Lecture	8	4.969	15.739
Tutorial	6	4.969	15.739
Audio recordings	6	4.969	15.739
Demonstrations/Role playing	0	4.969	15.739

*____ denotes point of critical value.

[a]Numbers represent degrees of effectiveness.

18 = most effective.

0 = least effective.

Null Hypothesis 4 (H_o^4): There are no personality type differences between selected successful registered nurses.

Data for this hypothesis are tabulated in Table 20. From Table 20 it can be seen that the 15 selected successful registered nurses were distributed in 9 of the 16 Latin Squares on the type table, with 6 of the 15 subjects equally divided into classifications of the squares ISTJ and ENFP. The dominant process that unifies the life of the ISTJ is Sensing; Thinking is his auxiliary process. With an introvert

> . . . the dominant process is engrossed with the inner world of concepts and ideas, and his auxiliary process does what it can about his outer life. He is the "most thorough of all types, painstaking, systematic, hard-working and patient with detail and routine. His perseverance tends to stabilize everything with which he is connected" (Myers-Briggs, 1962)

The ENFP

> . . . is the enthusiastic innovator, always seeing new possibilities--new ways of doing things and goes all out in pursuit of them. He has a lot of imagination and initiative for originating projects, and a lot of impulsive energy for carrying them out. He has remarkable insight into people and their possibilities (Myers-Briggs, 1962).

The two cells with the second largest number of registered nurses were ISFJ and ESFJ, where two individuals were classified into each square. The ISFJ is

> . . . super dependable and has a complete, realistic respect for the facts (Myers-Briggs, 1962).

A more thorough discussion of an ISFJ was included in Table 1 for student nurses. An ESFJ is practical, realistic, and concerned with the here and now. This type was also

discussed in more depth in Table 1.

Table 20. Distribution and Percentage Frequencies of Selected Successful Registered Nurses According to Personality Type (N = 15)

ISTJ	ISFJ	INFJ	INTJ
#1 20.0%	#2 13.3%	0	0
ISTP	ISFP	INFP	INTP
0	#1 6.6%	#1 6.6%	0
ESTP	ESFP	ENFP	ENTP
#1 6.6%	#1 6.6%	#3 20.0%	#1 6.6%
ESTJ	ESFJ	ENFJ	ENTJ
0	#2 13.3%	0	0

The squares of ESTP, ISFP, ESFP, and INFP each contained one individual. Each of these personality types was discussed under Table 1. Thus, the descriptions for these personality types were the same as that for the student nurses given in Table 1.

These data indicated an uneven distribution of personality types among the selected successful registered nurses. Four Latin Squares contained 66.6 percent of the registered nurses' sample. Five squares contained one subject each, while seven squares did not contain any subjects. These data showed a predominant number of Sensing-Feeling types.

Analysis of data for Null Hypothesis 4 (H_o^4) indicated that there were personality type differences between selected

successful registered nurses and therefore Null Hypothesis 4 is rejected. The accepted hypothesis would be:

There are personality type differences between selected successful registered nurses.

Null Hypothesis 5 (H_o^5): The method of teaching does not have an effect on selected successful registered nurses' learning.

The hypothesis was analyzed by giving selected registered nurses a Media Effectiveness Chart with blank Latin Squares. Selected successful registered nurses scored their preference for teaching methods by ratings of high, medium, or low. These ratings were converted to numerical scores. High was given 3 points, medium was given 2 points, and low was given 1 point. Data for this hypothesis were tabulated in Tables 21 and 22. Analysis of data for Null Hypothesis 5 indicated that there was a significant difference in the selected successful registered nurses' learning and the method of teaching. The F-score was 13.6, which exceeded the critical .05 level F-score of 2.33 for 194 degrees of freedom.

Table 21 illustrated computation for the analysis of variance; one-way classification for selected successful registered nurses' preferences for teaching methods. Selected successful registered nurses were divided into 15 separate spaces along the vertical side of the chart, coded by their four-letter personality type and designated number.

Table 21. Analysis of Variance for Data of Null Hypothesis 5, Computation for the Preferences of Selected Successful Registered Nurses for Teaching Methods

	Lecture	Discussion	Small Group Work	Audio Recordings	Readings (Texts, Articles)	Programmed Instruction	Tutorial	Symbols (Maps, Charts, Diagrams)	Pictures, Slides	Motion Pictures, TV	Field Trips	Demonstrations/Role Playing	Laboratory Work	
ISFJ(1)	13	17	13	7	13	10	18	9	13	15	10	14	13	
ISTJ(1)	10	14	17	6	15	9	10	9	9	9	6	15	13	
ISTJ(2)	12	12	13	8	13	11	14	12	13	12	14	10	18	
ISTJ(3)	6	7	9	6	13	8	12	12	14	13	10	14	15	
INFP(1)	15	15	14	12	13	14	14	13	13	13	15	13	17	
ISFP(1)	10	10	11	13	12	11	10	10	12	10	12	15	14	
ESFP(1)	9	13	15	11	6	7	7	10	7	15	15	15	13	
ENFP(1)	10	13	15	3	13	12	18	9	18	18	18	18	18	
ENFP(2)	13	16	18	12	16	12	17	6	13	13	15	7	6	
ENFP(3)	14	17	18	9	13	7	7	11	9	13	8	13	15	
ESFJ(1)	10	15	18	10	14	16	18	12	16	16	13	18	18	
ESFJ(2)	10	13	12	8	11	13	16	11	14	14	11	11	17	
ESTP(1)	12	14	12	10	9	9	10	12	15	12	14	13	10	
ENTP(1)	10	10	9	10	10	8	10	9	9	9	8	10	16	
ISFJ(2)	17	17	15	16	18	17	16	14	12	10	10	11	16	
n_j	15	15	15	15	15	15	15	15	15	15	15	15	15	$N = 195$
T_j	171	203	209	132	202	164	194	159	187	192	179	197	177	$T = 2366$
$\bar{X}_j = \frac{T_j}{n_j}$	11.4	13.5	13.9	8.8	13.4	10.9	12.9	10.6	12.4	12.8	11.9	13.1	11.8	$\frac{T^2}{N} = 28707.46$
$\sum_{i=1}^{n_j} Xi_j^2$	2053	2865	3041	1473	2497	1928	2807	1743	2453	2552	2289	2713	3351	$\sum_{j=1}^{k} \sum_{i=1}^{n_j} Xi_j = 31765$
$\frac{T_j^2}{n_j}$	1949.4	2747.2	2912.0	1161.6	2720.2	1793	2509	1685.4	2331	2457.6	2136	2587.2	2088.6	$\sum_{j=1}^{k} \frac{T_j^2}{n_j} = 1938.54$

SUM OF SQUARES

Between	1938.54	- 28707.46	= 26768.92
Within	31765.0	- 1938.54	= 29826.46
Total	31765	- 28707.46	= 3057.54

The horizontal scale was divided into 13 teaching methods represented on the MEC. The Latin Squares were numerically scored according to the preferences of the selected successful registered nurses.

Table 22. Analysis of Variance for Data of Table 21, Selected Individual Registered Nurses' Preferences for Teaching Methods.

Source of Variation	Sum of Squares	Degrees of freedom	Variance estimate
Between	26768.92	12	2230.74
Within	29826.46	182	163.88
Total	56595.38	194	F = 13.6

F = 13.6

Statistical analysis for the F-score followed the procedure outlined in Ferguson (p. 292) and as described earlier in this chapter for Null Hypothesis 2. The number of groups was 15. The number of degrees of freedom associated with the between group's sum of squares formula was k - 1 or in this case 15 - 1 = 14. The number of degrees of freedom associated with the within group's sum of squares formula was N - k or, in this case, the total of Latin Squares minus the number of groups = 195 - 15 = 180. The number of degrees of freedom associated with the total was found by using the formula N - 1 or in this case 195 - 1 = 194. The between and within sums of squares were divided by the associated degrees of freedom to obtain the variance estimates s_b^2 and s_w^2.

The F-ratio was s_b^2/s_w^2 = 2230.74/163.88 = 13.6. Consulting a table of F (Ferguson, 1966) with df = 14 associated with the numerator and 180 associated with the denominator, the value of F was found to be 2.33 at the .05 level of significance, and therefore Null Hypothesis 5 (H_o^5) is rejected. The accepted hypothesis would be:

The method of teaching does have an effect on successful registered nurses' learning.

Null Hypothesis 6 (H_o^6): The personality type of successful registered nurses does not affect the method of teaching (each personality type was measured for significance).

Data for this hypothesis are shown in Tables 23 and 24. To test the null hypothesis a chart was constructed representing each Jungian personality type with the number of individuals falling into each type. Median scores of each personality type's preferences for method of teaching were placed in each Latin Square (Table 23). Analysis of data for Null Hypothesis 6 indicated a significant difference in the personality type's learning and the method of teaching. The F-score was 16.4, which exceeded the critical .05 level F-score of 2.35 for 103 degrees of freedom.

Table 23 illustrated computation for the analysis of variance; one-way classification for selected successful registered nurses group into personality types and their preferences for learning and teaching methods. Selected successful registered nurses were grouped into personality types and the number of nurses falling into each type was

Table 23. Analysis of Variance for Data of Null Hypothesis 6, Selected Successful Registered Nurses Grouped in Personality Types and Their Preferences for Teaching Methods

	Lecture	Discussion	Small Group Work	Audio Recordings	Readings (Texts, Articles)	Programmed Instruction	Tutorial	Symbols (Maps, Charts, Diagrams)	Pictures, Slides	Motion Pictures/TV	Field Trips	Demonstrations/Role Playing	Laboratory Work	
ISFJ(1)	15	17	14	11.5	15	13.5	17	11.5	12.5	12.5	10	12.5	14.5	
ISTJ(3)	9.3	11	13	6.6	13.6	9.3	12	11	12	11.3	10	13	15.3	
INFP(1)	15	15	14	12	13	14	14	13	13	13	15	13	17	
ISFP(1)	10	10	11	13	12	11	10	10	12	10	12	15	14	
ESFP(1)	9	13	15	11	6	7	7	10	7	15	15	15	13	
ENFP(3)	12.3	15.3	17	8	14	10.3	14	8.6	13.3	14.6	13.6	12.6	13	
ESFJ(2)	10.3	14	15	9	12.5	14.5	17	11.5	15	15.3	12	14.5	17.5	
ESTP(1)	12	14	12	10	9	9	10	12	15	12	14	13	10	
n_j	8	8	8	8	8	8	8	8	8	8	8	8	8	$N = 104$
T_j	92.6	109.3	111	81.1	95.1	88.6	101	87.6	99.8	103.7	101.6	108.6	114.3	$T = 1294.3$
$\bar{X}_j = \frac{T_j}{n_j}$	11.5	13.6	13.8	10.1	11.8	11	12.6	10.9	12.4	12.9	12.7	13.5	14.2	$\frac{T^2}{N} = 16107.8$
$\sum_{i=1}^{n_j} Xi_j^2$	1112.7	1530	1565	854.7	1192.1	1031.9	1270.9	972.3	1289	1361.2	1318.9	1482.1	1673.4	$\sum_{j=1}^{k} \sum_{i=1}^{n_j} Xi_j^2 = 15654.2$
$\frac{T_j^2}{n_j}$	1071.8	1493.3	1540	822.15	1130.5	981.2	1275.1	959.2	1245	1344.2	1290.3	1474.2	1633.05	$\sum_{j=1}^{k} \frac{T_j^2}{n_j} = 15260.2$

SUM OF SQUARES

Between	15260.2 - 16107.8 = 847.6
Within	15654.2 - 15260.2 = 394
Total	15654.2 - 16107.8 = 453.6

coded by their four-letter personality type on the vertical scale of the table. The horizontal scale was divided into 13 teaching methods represented on the MEC. The Latin Squares were numerically scored according to the means of the collective nurses' preferences for each teaching method.

Table 24. Analysis of Variance for Data of Table 23, Personality Type of Successful Registered Nurses and Preferred Method of Teaching

Source of Variation	Sum of Squares	Degrees of freedom	Variance estimate
Between	847.6	12	70.63
Within	394	91	4.3
Total	1241.6	103	F - 16.4

Statistical analysis for the F-score followed the procedure outlined in Ferguson (p. 292) and described earlier in this chapter for Null Hypothesis 2. The number of groups was 8. The number of degrees of freedom associated with the between group's sum of squares formula was k - 1 or, in this case, 8 - 1 = 7. The number of degrees of freedom associated with the within group's sum of squares formula was N - k or, in this case, the total of Latin Squares minus the number of groups = 104 - 8 = 96. The number of degrees of freedom associated with the total was found by using the formula N - 1 or in this case 104 - 1 = 103. The between and within sums of squares were divided by the associated degrees of freedom to obtain the variance estimates s_b^2 and s_w^2.

The F-ratio is $s_b^2/s_w^2 = 70.63/4.3 = 16.4$. Consulting a table of F (Ferguson, 1966) with df = 7 associated with the numerator and 96 associated with the denominator, the value of F was found to be 2.35 at the .05 level of significance, and therefore Null Hypothesis 6 is rejected. The accepted hypothesis would be:

> The personality type of successsful registered nurses does affect the method of teaching.

Alternative Hypothesis 6 (H_1^6): Of the personality types of successful registered nurses where teaching method does matter, certain teaching methods are most productive for each personality type.

Statistical support for this hypothesis is shown on Tables 25 through 33. To test the Alternative Hypothesis 6, a chart was constructed representing each personality type and the number of individuals falling into this type and their preference for teaching method (Table 23).

In Table 23 it was seen that audio recordings scored a T_j of 81.1. Audio recordings' T_j score was the lowest of all teaching methods. Audio recordings, compared to other T_j scores of teaching methods, were as follows: lecture 92.6, discussion 109.3, small group work 111, readings 95.1, programmed instruction 88.6, tutorial 101, symbols 87.6, pictures/slides 99.8, motion pictures/TV 103.7, field trips 101.6, demonstrations/role playing 108.6, and laboratory 114.3. From these data it was seen that undoubtedly audio

Table 25. Preferred Teaching Methods of Selected Successful Registered Nurses Grouped in Personality Types

Comparison of Audio with Other Teaching Methods	Degrees of Freedom	t Critical Value	t Obtained	Accepted or Rejected
Audio-Readings	82	1.67	7.20	Accepted
Audio-Small group work	82	1.67	3.54	Accepted
Audio-Discussion	82	1.67	3.31	Accepted
Audio-Demonstration	82	1.67	3.00	Accepted
Audio-Movie	82	1.67	2.87	Accepted
Audio-Tutorial	82	1.67	2.555	Accepted
Audio-Slides	82	1.67	2.553	Accepted
Audio-Field trip	82	1.67	2.10	Accepted
Audio-Lecture	82	1.67	1.84	Accepted
Audio-Programmed instruction	82	1.67	1.57	Rejected
Audio-Symbols	82	1.67	1.35	Rejected
Audio-Laboratory	82	1.67	1.09	Rejected

recordings were the lowest of nurses' preferred teaching and learning methods. Therefore, all other teaching methods were compared to audio recordings (Table 25) to determine whether each of the other methods was significantly more effective for each of the personality types.

Analysis of data for Alternative Hypothesis 6 indicated a significant difference in teaching methods used for personality types. The t-scores for 10 teaching methods ranged from 7.20 to 184, which exceeded the

critical .05 level t-score of 1.67 for 82 degrees of freedom. These teaching methods, however, did not exceed the 1.67 level of significance and therefore would not be considered significantly more effective teaching methods than audio recordings for registered nurses grouped into personality types. The t-score range for each teaching method was as follows: readings 7.20, small group work 3.54, discussion 3.31, demonstrations 3.00, motion pictures/TV 2.87, tutorial 2.555, pictures/slides 2.553, field trips 2.10, lecture 1.84, programmed instruction 1.57, symbols 1.35, and laboratory 1.09.

Another way of looking at Alternative Hypothesis 6 was to base measurement of personality type and learning styles upon standard deviation (Table 26). The median scores of selected successful registered nurses' preferences for teaching methods were placed in the Latin Squares. The standard deviation was derived for each personality type, measuring the fluctuation in the means of each of the 13 learning styles significant at the .05 level.

In turn, z-scores were used (Table 26). The standard deviation for each personality type was multiplied by 1.96 (two standard deviations). The product of this equation was added to the lowest score of learning style preference. The z-score (critical score) obtained provided the significant base level of learning style that would most benefit the Jungian personality type. The z-scores obtained were all significant at the .05 level. The z-score

Table 26. Standard Deviations of the Means and Critical Values (z-Scores), Personality Types of Selected Successful Registered Nurses and Their Preferred Method of Teaching

	Lecture	Discussion	Small Group Work	Audio Recordings	Readings (Texts, Articles)	Programmed Instruction	Tutorial	Symbols (Maps, Charts, Diagrams)	Pictures, Slides	Motion Pictures/TV	Field Trips	Demonstrations/ Role Playing	Laboratory Work	Standard Deviations of the Means	z-Score, Critical Values
ISFJ	15	17	14	11.5	15	13.5	17	11.5	12.5	12.5	10	12.5	14.5	2.109	14.11
ISTJ	9.3	11	13	6.6	13.6	9.3	12	11	12	11.3	10	13	15.3	2.239	13.67
INFP	15	15	14	12	13	14	14	13	13	13	15	13	17	1.320	14.58
ISFP	10	10	11	13	12	11	10	10	12	10	12	15	14	2.645	15.18
ESFP	9	13	15	11	6	7	7	10	7	15	15	15	13	3.535	12.91
ENFP	12.3	15.3	17	8	14	10.3	14	8.6	13.3	14.6	13.6	12.6	13	2.549	12.97
ESFJ	10.3	14	15	9	12.5	14.5	17	11.5	15	15	12	14.5	17.5	2.493	13.88
ESTP	12	14	12	10	9	9	10	12	15	12	14	13	10	1.974	12.86

was significant for all personality types for some of the teaching methods. This is illustrated by the data tabulated in Tables 27 through 34.

In Tables 27 through 34, median ranks were assigned to preferred learning styles as previously tabulated in the Latin Squares (Table 26). The critical score (z-score) was then used to denote the point of critical value, the line of demarcation, for most and least effective methods of instruction. The methods of preferred learning styles were ranked according to the degree of effectiveness, with the number at the top of the column representing the most effective method and the number at the bottom of the column representing the least effective method. In all personality types there were some teaching methods exceeding the z-score significant at the .05 level. Therefore Alternative Hypothesis 6 (H_1^6) is accepted. The accepted hypothesis would be:

> Of the personality types of successful registered nurses where teaching method does matter, certain teaching methods are most productive for each personality type.

Analysis of Alternative Hypothesis 6 by individual personality types showed that a different teaching method is most effective and least effective for each specific Jungian personality type. As shown in Table 27, the successful registered nurse with personality type ISFJ would learn most effectively by discussion and tutorial. The ISFJ would learn least effectively by field trips, symbols, and

Table 27. Median Ranks Assigned to Preferred Learning Styles by Selected Successful Registered Nurses with the Jungian Personality Type ISFJ[a]

Learning Style	Mean of Latin Squares	Standard Deviation	Critical Value
Discussion	17	2.109	14.11
Tutorial	17	2.109	14.11
Lecture	15	2.109	14.11
Readings (texts, articles)	15	2.109	14.11
Laboratory	14.5	2.109	14.11
	____*		
Small group work	14	2.109	14.11
Programmed instruction	13.5	2.109	14.11
Pictures/Slides	12.5	2.109	14.11
Motion pictures/TV	12.5	2.109	14.11
Demonstrations/Role playing	12.5	2.109	14.11
Audio recordings	11.5	2.109	14.11
Symbols (maps, charts, diagrams)	11.5	2.109	14.11
Field trips	10	2.109	14.11

*____ denotes point of critical value.

[a]Numbers represent degrees of effectiveness.

17 = most effective.

10 = least effective.

audio recordings. According to data, the ISFJ would also learn effectively by lecture, readings, and laboratory work. Other ineffective methods of learning (below the line of critical value) were demonstrations/role playing, motion pictures/TV, pictures/slides, programmed instruction, and small group work. These data did not indicate that laboratory would be a significantly more effective method of teaching than small group work. However, in 95 cases out of 100 it would be predicted that methods above the line of critical value would be significantly more effective than those below it for the registered nurse with personality type ISFJ.

Table 28 presented data that illustrated the registered nurse with personality type ISTJ would learn most effectively from laboratory and readings. The ISTJ registered nurse would learn least effectively from audio recordings. The ineffective methods of teaching were more numerous than those that would be more effective. Ineffective methods for the ISTJ also included lecture, programmed instruction, field trips, discussion, symbols, motion pictures/TV, pictures/slides, tutorial, small group work, and demonstrations/role playing.

As indicated in Table 29, the registered nurse with personality type INFP would learn most effectively from laboratory and least effectively from audio recordings. Without a doubt, the INFP should not be expected to learn effectively from audio recordings. Teaching methods that would

Table 28. Median Ranks Assigned to Preferred Learning Styles by Selected Successful Registered Nurses with the Jungian Personality Type ISTJ[a]

Learning Style	Mean of Latin Squares	Standard Deviation	Critical Value
Laboratory	15.3	2.235	13.67
Readings (Texts, articles)	13.6 ____*	2.235	13.67
Demonstrations/Role playing	13	2.235	13.67
Small group work	13	2.235	13.67
Tutorial	12	2.235	13.67
Pictures/Slides	12	2.235	13.67
Motion pictures/TV	11.3	2.235	13.67
Symbols (maps, charts, diagrams)	11	2.235	13.67
Discussion	11	2.235	13.67
Field trips	10	2.235	13.67
Programmed instruction	9.3	2.235	13.67
Lecture	9.3	2.235	13.67
Audio recordings	6.6	2.235	13.67

*____ denotes point of critical value.

[a]Numbers represent degrees of effectiveness.

15.3 = most effective.

6.6 = least effective.

Table 29. Median Ranks Assigned to Preferred Learning Styles by Selected Successful Registered Nurses with the Jungian Personality Type INFP[a]

Learning Style	Mean of Latin Squares	Standard Deviation	Critical Value
Laboratory	17	1.320	14.587
Field trips	15	1.320	14.587
Lecture	15	1.320	14.587
Discussion	15	1.320	14.587
	____*		
Small group work	14	1.320	14.587
Programmed instruction	14	1.320	14.587
Tutorial	14	1.320	14.587
Symbols (maps, charts, diagrams)	13	1.320	14.587
Pictures/Slides	13	1.320	14.587
Motion pictures/TV	13	1.320	14.587
Demonstrations/Role playing	13	1.320	14.587
Readings (texts, articles)	13	1.320	14.587
Audio recordings	12	1.320	14.587

*____ denotes point of critical value.

[a]Numbers represent degrees of effectiveness.

17 = most effective.

12 = least effective.

also benefit the INFP included field trips, lecture, and discussion. Other methods falling below the line of critical value included readings, demonstrations/role playing, motion pictures/TV, pictures/slides, symbols, tutorial, programmed instruction, and small group work.

Jungian personality type ISFP for registered nurses indicated a preference for learning effectively from demonstrations/role playing and laboratory. All other teaching methods were considered ineffective, as they were below the line of critical value. These included motion pictures/TV, discussion, lecture, tutorial, symbols, programmed instruction, small group work, field trips, pictures/slides, readings, and audio recordings. Five methods of ineffective teaching received the same median scores: symbols, tutorial, lecture, discussion, and motion pictures/TV. The latter would be the least effective method of teaching for the registered nurse with personality type ISFP (Table 30).

Equally effective methods of teaching the registered nurse with personality type ISFP would be small group work, motion pictures/TV, field trips, and demonstrations/role playing. Laboratory and discussion would also be considered effective. Ineffective methods of learning for the ESFP would be readings, programmed instruction, tutorial, pictures/slides, lecture, symbols, and audio recordings. For the ESFP, six methods of teaching were above the line of critical value while seven fell below it (Table 31).

Table 30. Median Ranks Assigned to Preferred Learning Styles by Selected Successful Registered Nurses with the Jungian Personality Type ISFP[a]

Learning Style	Mean of Latin Squares	Standard Deviation	Critical Value
Demonstrations/Role playing	15	1.664	13.261
Laboratory	14	1.664	13.261
	____*		
Audio recordings	13	1.664	13.261
Readings (texts, articles)	12	1.664	13.261
Pictures/Slides	12	1.664	13.261
Field trips	12	1.664	13.261
Small group work	11	1.664	13.261
Programmed instruction	11	1.664	13.261
Symbols (maps, charts, diagrams)	10	1.664	13.261
Tutorial	10	1.664	13.261
Lecture	10	1.664	13.261
Discussion	10	1.664	13.261
Motion pictures/TV	10	1.664	13.261

*____ denotes point of critical value.

[a]Numbers represent degrees of effectiveness.

15 = most effective.

10 = least effective.

Table 31. Median Ranks Assigned to Preferred Learning Styles by Selected Successful Registered Nurses with the Jungian Personality Type ESFP[a]

Learning Style	Mean of Latin Squares	Standard Deviation	Critical Value
Small group work	15	3.535	12.918
Motion pictures/TV	15	3.535	12.918
Field trips	15	3.535	12.918
Demonstrations/Role playing	15	3.535	12.918
Laboratory	13	3.535	12.918
Discussion	13	3.535	12.918
	____*		
Audio recordings	11	3.535	12.918
Symbols (maps, charts, diagrams)	10	3.535	12.918
Lecture	9	3.535	12.918
Pictures/Slides	7	3.535	12.918
Tutorial	7	3.535	12.918
Programmed instruction	7	3.535	12.918
Readings (texts, articles)	6	3.535	12.918

*____ denotes point of critical value.

[a]Numbers represent degrees of effectiveness.

15 = most effective.

6 = least effective.

The registered nurse with personality type ENFP indicated a strong preference to learn from small group work (Table 32). Audio recordings and symbols should not be used with the ENFP as they were very ineffective methods of learning for that personality type. Other ineffective methods of learning would be programmed instruction, lecture, and demonstrations/role playing. Effective methods of instruction, in addition to small group work, would be discussion, motion pictures/TV, tutorial, readings, field trips, pictures/slides, and laboratory. However, these data did not indicate whether laboratory would be significantly more effective than demonstrations/role playing.

The registered nurse with Jungian personality type ESFJ indicated a strong preference to learn from laboratory and tutorial. Other effective methods of teaching would be motion pictures/TV, pictures/slides, small group work, demonstrations/role playing, programmed instruction, and discussion. The least effective method for the ESFJ would be audio recordings. Other ineffective methods would be lecture, symbols, field trips, and readings (Table 33).

Table 34 indicated that the registered nurse with personality type ESTP would learn most effectively from pictures/slides. Field trips and discussion would be the second most effective teaching methods. Demonstrations/role playing would also serve as an effective teaching method.

Table 32. Median Ranks Assigned to Preferred Learning Styles by Selected Successful Registered Nurses with the Jungian Personality Type ENFP[a]

Learning Style	Mean of Latin Squares	Standard Deviation	Critical Value
Small group work	17	2.549	12.978
Discussion	15.3	2.549	12.978
Motion pictures/TV	14.5	2.549	12.978
Tutorial	14	2.549	12.978
Readings (texts, articles)	14	2.549	12.978
Field trips	13.5	2.549	12.978
Pictures/Slides	13.3	2.549	12.978
Laboratory	13	2.549	12.978
	____*		
Demonstrations/Role playing	12.6	2.549	12.978
Lecture	12.3	2.549	12.978
Programmed instruction	10.3	2.549	12.978
Symbols (maps, charts, diagrams)	8.6	2.549	12.978
Audio recordings	8	2.549	12.978

*____ denotes point of critical value.

[a]Numbers represent degrees of effectiveness.

17 = most effective.

8 = least effective.

Table 33. Median Ranks Assigned to Preferred Learning Styles by Selected Successful Registered Nurses with the Jungian Personality Type ESFJ[a]

Learning Style	Mean of Latin Squares	Standard Deviation	Critical Value
Laboratory	17.5	2.493	13.880
Tutorial	17	2.493	13.880
Motion pictures/TV	15.3	2.493	13.880
Pictures/Slides	15	2.493	13.880
Small group work	15	2.493	13.880
Demonstrations/Role playing	14.5	2.493	13.880
Programmed instruction	14.5	2.493	13.880
Discussion	14	2.493	13.880
	____*		
Readings (texts, articles)	12.5	2.493	13.880
Field trips	12	2.493	13.880
Symbols (maps, charts, diagrams)	11.5	2.493	13.880
Lecture	10.3	2.493	13.880
Audio recordings	9	2.493	13.880

*____ denotes point of critical value.

[a]Numbers represent degrees of effectiveness.

17.5 = most effective.

9 = least effective.

Table 34. Median Ranks Assigned to Preferred Learning Styles by Selected Successful Registered Nurses with the Jungian Personality Type ESTP[a]

Learning Style	Mean of Latin Squares	Standard Deviation	Critical Value
Pictures/Slides	15	1.974	12.861
Field trips	14	1.974	12.861
Discussion	14	1.974	12.861
Demonstrations/Role playing	13	1.974	12.861
	____*		
Motion pictures/TV	12	1.974	12.861
Symbols (maps, charts, diagrams)	12	1.974	12.861
Small group work	12	1.974	12.861
Lecture	12	1.974	12.861
Audio recordings	10	1.974	12.861
Tutorial	10	1.974	12.861
Laboratory	10	1.974	12.861
Readings (texts, articles)	9	1.974	12.861
Programmed instruction	9	1.974	12.861

*____ denotes point of critical value.

[a]Numbers represent degrees of effectiveness.

15 = most effective.

9 = least effective.

Ineffective methods for the ESTP would include programmed instruction, readings, laboratory, tutorial, audio recordings, lecture, small group work, symbols, and motion pictures/TV. (These methods fell below the line of critical value.)

Null Hypothesis 7 (H_o^7): There is no difference in the personality type learning style comparison between students and successful registered nurses.

The data from Table 6, Selected Nursing Students Grouped in Personality Types and Their Preferred Teaching Methods, and the data from Table 25, Selected Successful Registered Nurses Grouped in Personality Types and Their Preferred Teaching Methods, were combined (Table 35). The t-test was used to compare preference for teaching methods of nursing students grouped into personality types with preference for teaching methods of registered nurses grouped into personality types. For the comparisons between students' preferences and registered nurses' preferences to be significant, the t had to exceed the 1.67 value. The .05 level of significance was used as the basis for rejection of the hypothesis.

In Table 35, student nurses' preferences were used as a basis for comparison with the preferences of registered nurses. It was seen that only one teaching method exceeded the 1.67 critical value, which indicated that student nurses preferred lecture more significantly than did the registered

Table 35. Comparison of Preferences for Teaching Methods Between Selected Successful Registered Nurses Grouped in Personality Types and Selected Student Nurses Grouped in Personality Types

Comparison of Preference for Teaching Methods	Degrees of Freedom	t Critical Value	t Obtained	Accepted or Rejected
Lecture	82	1.67	3.71	Rejected
Demonstration	82	1.67	1.15	Accepted
Small group work	82	1.67	0.37	Accepted
Tutorial	82	1.67	0.25	Accepted
Discussion	82	1.67	0.09	Accepted
Audio recordings	82	1.67	-0.016	Accepted
Readings (texts, articles)	82	1.67	-0.307	Accepted
Programmed instruction	82	1.67	-0.919	Accepted
Symbols (maps, charts, diagrams)	82	1.67	-2.050	Accepted
Slides/Pictures	82	1.67	-0.441	Accepted
Motion pictures/TV	82	1.67	-0.301	Accepted
Field trips	82	1.67	-1.107	Accepted
Laboratory	82	1.67	-0.838	Accepted

nurses. There was little difference between the students' preference for demonstration and that of the registered nurses. When comparing small group work, it was indicated that students preferred to learn less by small group work than did the registered nurses. The tutorial method continued to be preferred more frequently by registered nurses than by students. Data for registered nurses

continued to indicate a trend toward favoring the following methods of instruction more than the student nurses favored the same methods: discussion, audio recordings, motion pictures/TV, readings, pictures/slides, laboratory, programmed instruction, field trips, and symbols. This is not to say that any of the trends mentioned were of significant value based on the data presented here, with the exception of lecture. The t-score for lecture method exceeded the critical t-value of 1.67 at the .05 level of significance, with a t of 3.71 obtained. Therefore Null Hypothesis 7 (H_o^7) is rejected. The accepted hypothesis would be:

There is a difference in the personality type learning style between students and successful registered nurses.

Null Hypothesis 8 (H_o^8): There are no personality type differences between selected student nurses and selected successful registered nurses.

From Tables 11 and 19, a summary of the percentage frequencies and distribution of the 16 Jungian personality types for student nurses and successful registered nurses is presented (Table 36). Student nurses had 18.6 percent falling in the ESFJ personality type while registered nurses had only 13.3 percent. Student nurses had only 2.3 percent of the ISTJ personality type, while registered nurses had 20.0 percent in the ISTJ type. Student nurses had 13.9 percent in the ISFJ personality type while registered nurses had 13.3 percent in the ISFJ type. Student nurses had 13.9

Table 36. Distribution and Percentage Frequencies of the 16 Jungian Personality Types for Selected Nursing Students and Selected Successful Registered Nurses

Personality Type	Selected Student Nurses		Successful Registered Nurses	
	#	%[a]	#	%[b]
ISTJ	1	2.3	3	20.0
ISFJ	6	13.9	2	13.3
INFJ	2	4.6	0	0
INTJ	1	2.3	0	0
ISTP	0	0	0	0
ISFP	4	9.3	1	6.6
INFP	5	11.6	1	6.6
INTP	0	0	0	0
ESTP	2	4.6	1	6.6
ESFP	6	13.9	1	6.6
ENFP	3	6.9	3	20.0
ENTP	1	2.3	1	6.6
ESTJ	2	4.6	0	0
ENFJ	3	6.9	0	0
ENTJ	0	0	0	0
ESFJ	8	18.6	2	13.3
Total	43	100.0	15	100.0

[a]Percent of 43 student nurses.

[b]Percent of 15 registered nurses.

percent in the ESFP personality type, while only 6.6 percent of the registered nurses fell into this type. Registered nurses had 20.0 percent in the ENTP personality type, while student nurses had only 6.9 percent in the ENTP type.

Analysis of data for Null Hypothesis 8 indicated a personality type difference between selected student nurses. Therefore Null Hypothesis 8 (H_o^8) is rejected. The accepted hypothesis would be:

> There are personality type differences between selected student nurses and selected successful registered nurses.

Chapter 5

FINDINGS, CONCLUSIONS, DISCUSSION, AND IMPLICATIONS

FINDINGS

Data obtained from this study supported the findings from the following hypotheses that were tested:

1. Null Hypothesis 1 (H_o^1): There are no personality type differences between selected student nurses.

   Null Hypothesis 1 (H_o^1) was rejected.

2. Null Hypothesis 2 (H_o^2): The method of teaching does not have an effect on students' learning.

   Null Hypothesis 2 (H_o^2) was rejected.

3. Null Hypothesis 3 (H_o^3): The personality type of students does not affect the method of teaching (each personality type was measured for significance).

   Null Hypothesis 3 (H_o^3) was rejected.

4. Alternative Hypothesis 3 (H_1^3): Of the personality types of students where teaching method does matter, certain teaching methods are most productive for each personality type.

   Alternative Hypothesis 3 was accepted.

5. Null Hypothesis 4 (H_o^4): There are no personality type differences between selected successful registered nurses.

Null Hypothesis 4 (H_o^4) was rejected.

6. Null Hypothesis 5 (H_o^5): The method of teaching does not have an effect on successful registered nurses' learning.

   Null Hypothesis 5 (H_o^5) was rejected.

7. Null Hypothesis 6 (H_o^6): The personality type of successful registered nurses does not affect the method of teaching (each personality type was measured for significance).

   Null Hypothesis 6 (H_o^6) was rejected.

8. Alternative Hypothesis 6 (H_1^6): Of the personality types of successful registered nurses where teaching method does matter, certain teaching methods are most productive for each personality type.

   Alternative Hypothesis 6 (H_1^6) was accepted.

9. Null Hypothesis 7 (H_o^7): There is no difference in the personality type learning style comparison between students and successful registered nurses.

   Null Hypothesis 7 (H_o^7) was rejected.

10. Null Hypothesis 8 (H_o^8): There is no difference between the personality types of students and those of registered nurses.

    Null Hypothesis 8 (H_o^8) was rejected.

CONCLUSIONS

The problems of this study were to determine the Jungian Personality Function Types and preferred learning

styles of selected nursing students and selected successful registered nurses, to identify preferences for learning styles of selected student nurses and selected successful registered nurses, and to compare the personality types learning styles of the groups.

From the hypotheses tested, the following conclusions were drawn:

1. There were personality type differences between selected student nurses.
2. The method of teaching did have an effect on students' learning.
3. The personality type of students did affect the method of teaching.
4. Of the personality types of students where teaching method did matter, certain teaching methods were most productive for each personality type.
5. There were personality type differences between successful registered nurses.
6. The method of teaching did have an effect on successful registered nurses' learning.
7. The personality type of successful registered nurses did affect the method of teaching.
8. Of the personality types of successful registered nurses where teaching method did matter, certain teaching methods were most productive for each personality type.
9. There was a difference in the personality type learning style comparison between students and successful

registered nurses.

10. There was a difference between the personality types of students and those of registered nurses.

DISCUSSION

Student nurses were distributed in 13 of the 16 Latin Squares of the Jungian Personality Function Type Table. Successful registered nurses were distributed in nine of the 16 Latin Squares on the Jungian Personality Function Type Table. The student nurses clustered in the square ESFJ, while the successful registered nurses were mainly distributed between the squares of ISTJ and ENFP. This indicated that students had a preference for Extroversion, Sensing, Feeling, and Judging, while registered nurses indicated equal preference for Introversion, Sensing, Thinking, and Judging and Extroversion, Intuition, Feeling, and Perception.

In the classroom and clinical laboratory setting, the nursing student must combine her/his feeling for people with the practical, realistic process of studies at the college and functioning in the clinical setting. Functioning in the various clinical settings where student nurses were assigned requires a basic desire to work with people. Hospital areas require that a student begin to perform, with a very high degree of accuracy and precision, routine and nursing procedures. Now, more than in the past, the student must also communicate in depth with patients and health personnel. The hospital area maintains a

highly structured environment operating on a planned and scheduled basis. From this description it is seen that student nurses who are later to be employees in health and hospital settings need to be humanitarian, practical, realistic, make decisions based upon facts, and adapt to routine work. The most frequent types found in the student nurse group were the ESFJ, who in theory are well suited in dealing with people, routine, and making practical decisions.

Successful registered nurses were presently working in the hospital and health settings previously discussed. Registered nurses who hold administrative positions must frequently make impersonal decisions based upon rules and regulations for that particular institution. These responsibilities call for the ISTJ, who is concerned with the inner world of ideas, is the most thorough of all types, and is patient with detail and routine. On the other hand, some health settings call for innovation, enthusiasm, and imagination. Communication with parents of patients as well as patients of all ages involved in many problem situations calls for a nurse who has energetic ability to respond spontaneously to new and varied occurrences. Old routines must be replaced and new policies evolved. This type of work would be well suited to the ENFP type.

From this part of the study it has been concluded that the personality types of nursing students and successful registered nurses correspond to their respective areas of responsibility in the school and health areas. Some poor

communication that arises between students and working registered nurses may be due to differences in the large distribution of varied personality types that have been found in this study, particularly between the Sensing and Intuitive types.

While a large percentage of student nurses and successful registered nurses were of the Feeling type, it is lower than the national data thus far collected on nurses and other allied health personnel, where the percentage of Feeling types is approximately 70-80 percent.[1]

It was found in this study that there is an apparent need for a course or opportunity in communication skills in the educational program for student nurses and registered nurses dealing with personality types of all kinds. The need for this is based upon the wide dispersal of students and registered nurses falling into a great number of personality types. This is discussed in the section of this chapter devoted to implications for practice and education.

Students, individually, preferred to learn by certain teaching methods. It was seen in this study that students least desired to learn by method that involved only audio recordings. They ranked lecture as their most desired instructional method. Since listening to tapes or records or radio involved only one sense, that of hearing, a great part of the students' physical and mental characteristics was not

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[1]Personal communication from Mary H. McCaulley.

involved. This may lead to boredom and restlessness on the part of the learner, as review of literature has demonstrated that the most effective learning takes place when many physical and mental characteristics of the learner are involved. Lecture, on the other hand, involves listening and seeing. Although this is not a teaching method that requires much independent involvement on the part of the student, it is one with which the student is comfortable as this is what has most commonly been used in school systems in the last thirty to forty years. Discussion, small group work, and laboratory ranked closely for a second-favored position when personality types of students and preferred teaching methods were compared. Learning in these situations requires both mental and physical characteristics on the part of the learner and generally requires a more independent aspect of the individual to be brought into the learning situation. It is in these learning situations that greater participation than audio and lecture is required, and therefore more permanent learning will probably take place as cognitive and psychomotor skills are needed. Affective learning may also occur to a greater degree because of the active participation required of the learner.

Registered nurses also were found in this study, individually and when grouped into personality type, to prefer to learn by certain teaching methods. Again, audio was the least preferred method of learning. We know that there are individuals who learn chiefly by reading, others learn

physically, while there are individuals who learn best by hearing. Evidently there are not many individuals of this last category represented in this study.

Readings placed first as a preferred method of learning for registered nurses. This preference may be reflected in the proportion of individuals typed as introverts within the registered nurse sample and would reflect that personality preference of being mainly interested in the inner world of ideas and concepts. Small group work and discussion, which rank second in the preferences of registered nurses when grouped into personality type, may be reflected in the proportion of individuals typed as extroverts within the registered nurse sample and would reflect that personality preference of being mainly interested in the outer world of people and things.

Finally, in comparing the personality type learning style between student nurses grouped into personality types (Table 4) and successful registered nurses grouped into personality types (Table 23), it was found that student nurses preferred the lecture method significantly more than did registered nurses. There was no significant difference between other preferences for learning between student nurses grouped into personality types and successful registered nurses grouped into personality types.

Students, when identified by Jungian personality function type, preferred to learn by certain teaching methods. Learning styles least preferred were also determined. Student

nurses with the personality type of ISFJ ranked field trips as their most desired instructional method. The ISFJ, being realistic, with practical respect for the facts, wants everything clearly stated and made familiar. Therefore, it can be seen that field trips, which would provide down-to-earth factual presentation of subject matter to be clearly seen by the ISFJ, would assist him in personal appraisal of the learning situation. Discussion, small group work, readings, pictures/slides, tutorial, lecture, motion pictures/TV, programmed instruction, and symbols also would be methods of instruction that would benefit the student nurse with the personality type of ISFJ. Methods of teaching that would not be effective for the ISFJ would be demonstrations/role playing, audio recordings, and laboratory, in that order of least preference.

The student nurses with the personality type of ISTJ ranked programmed instruction as their most desired instructional method. The ISTJ absorbs, remembers, and uses facts by great numbers. He has a memory for detail. Programmed instruction could provide the ISTJ facts in a planned and orderly manner if guided by specific objectives. With readings listed as second preference by the ISTJ for teaching methods, it was seen that these two methods could be presented together well in a programmed text, for example. Since the ISTJ likes everything clearly stated, he could refer to this programmed reading packet time and again if so desired. Laboratory and lecture were other teaching methods

by which the ISTJ could learn effectively. Methods of instruction that would not be effective for the ISTJ would be motion pictures/TV, field trips, audio recordings, pictures/slides, demonstrations/role playing, symbols, tutorial, small group work, and discussion, in that order least preferred.

Field trips were ranked as the preferred learning method by the student nurse with the personality type of ISFP. The ISFP chooses his final values with reference to the judgment of outsiders and sticks to them with passionate conviction. The contacts he prizes are with people who understand his values and the goals he is working toward. Field trips, with objectives stated prior to the investigation, could provide contact with people working in the educational area being studied. Opportunity to talk with these workers could provide the ISFP insight into the attitudes and beliefs that the ISFP prizes so greatly. Lecture, small group work, discussion, symbols, pictures/slides, laboratory, motion pictures/TV, and demonstrations/role playing were listed as other teaching methods that would be effective for the student nurse with the personality type of ISFP. Methods of instruction that would not be effective for the ISFP would be audio recordings, tutorial, readings, and programmed instruction.

Discussion was ranked as the preferred learning method by the student nurse with the personality type of INFP. The INFP sees the possibilities and is ingenious and persuasive on the subject of his enthusiasms, which are deep-rooted.

Discussion would give the INFP an opportunity to exchange new ideas of long-range vision as well as develop his or her powers of persuasion. Being interested in language is a characteristic of the INFP and the discussion method of instruction would give him or her the opportunity to participate and develop this positive quality. Lecture, small group work, readings, symbols, and programmed instruction would be other effective methods of instruction for the INFP. Methods of instruction that would not be effective for the INFP would be audio recordings, motion pictures/TV, demonstrations/role playing, pictures/slides, laboratory, field trips, and tutorial. Audio recordings should not be used for any type of instruction for the INFP as it is of very low preference.

The student with the personality type of INFJ selected tutorial as the preferred instructional method. The INFJ is the outstanding innovator in the field of ideas, principles, and systems of thought. Problems stimulate him. He should not be smothered in a routine job full of details. Objectives for a tutorial experience should ensure that the student nurse with the INFJ type of personality is linked with an individual suitable in innovative personality type and not one who is more concerned with details than with possibilities. The tutorial experience should be one that outlines objectives which include problems that require depth of purpose and possibility for the INFJ to expand his or her inspirations. The tutor should also be an individual who can

point out views other than those held by the INFJ, to aid him in avoiding such single-minded concentration that might conflict with rights and interests of other people. Pictures/slides, field trips, and demonstrations/role playing are other effective methods of instruction for the INFJ. Methods of instruction to be avoided for the INFJ would be audio recordings, symbols, small group work, programmed instruction, discussion, lecture, readings, motion pictures/TV, and laboratory. These last-named methods would not lead to effective learning for the INFJ.

Demonstrations/role playing and motion pictures/TV were equally ranked as preferred instructional methods for the student nurse with the personality type of ESTP. The ESTP is an adaptable realist who good-naturedly accepts and uses facts around him. He knows more and remembers more facts than any other type. The ESTP gets more from first-hand experience than from books. He is apt to be interested in machinery. Demonstrations and motion pictures/TV could be utilized as instruction that would give the ESTP a factual presentation, which could be returned by him or her in a role playing method. This combination could provide the facts that the ESTP cherishes and uses to good advantage. The ESTP would have the opportunity to obtain information in a first-hand, realistic manner that would give him or her the opportunity to use his hands or physical ability to learn and to retain learning. This would be much more effective in his learning than teaching methods that require understanding of

a great deal of language. Laboratory and symbols would also be effective methods of instruction. Methods of instruction to be avoided for the ESTP would be audio recordings, programmed instruction, readings, lecture, discussion, pictures/slides, tutorial, and field trips, as they would not aid him in learning effectively.

The student nurse with the personality type of ESTJ preferred to learn by readings. The ESTJ is analytic, impersonal, objectively critical, and not likely to be convinced of anything except by reasoning. He is matter-of-fact and realistic. The characteristics of the ESTJ could be respected by well defined objectives or guidelines to accompany his or her reading assignments. Readings would provide the impersonal and reasoning basis the ESTJ requires in order to learn effectively. Lecture and motion pictures/TV would also be used effectively with the ESTJ. The teaching methods to be avoided for the student nurse with the personality type of ESTJ are numerous. They are audio recordings, tutorial, demonstrations/role playing, discussion, laboratory, field trips, pictures/slides, symbols, small group work, and programmed instruction.

Lecture is the most preferred method of instruction for the student nurse with the type of ESFP, with discussion running a very close second. The ESFP has been described as being an adaptable realist who has some difficulty in seeing the value of new ideas, theories, and possibilities because intuition is his least developed process. Lecture, combined

with discussion, could provide the ESFP with the opportunity to have a persuasive individual present new ideas in an acceptable manner to the ESFP. Discussion could then be used in combination with lecture to provide opportunity for the ESFP to test his grasp of the new theories and ideas, and receive instant feedback from the lecturer. The adaptability of the ESFP would aid him in this type of a learning environment. Another method of instruction acceptable and effective for the ESFP would be readings. The teaching methods to be avoided for the student nurse with the personality type of ESFP are numerous. They are audio recordings, programmed instruction, tutorial, symbols, pictures/slides, small group work, field trips, laboratory, demonstrations/role playing, and motion pictures/TV. These methods mentioned would not be effective methods for encouraging the ESFP to learn effectively.

The nursing student with the personality type of ESFJ preferred to learn by the tutorial method of instruction. The ESFJ is chiefly concerned with people and is at his best when dealing with people. He is at best with face-to-face cooperative work. He thinks best when talking with people. The tutorial method of instruction could be designed to provide instruction to meet the needs of the ESFJ by providing the human warmth of feeling so prized by the ESFJ. A positive stimulus response method of instruction could be provided by the tutor to aid the ESFJ in learning effectively. Many other instructional methods would be effective for the

ESFJ. These include laboratory, motion pictures/TV, lecture, programmed instruction, readings, small group work, field trips, demonstrations/role playing, and discussion. Methods of instruction that would be ineffective are few in number. The ineffective methods to be avoided include audio recordings, symbols, and pictures/slides.

The student nurse with the personality type of ENFP would learn effectively by many methods of instruction, but favored lecture and tutorial equally. The ENFP is described as the enthusiastic innovator and is very concerned with people. He has remarkable insight into people and their development. He may become almost anything that interests him. Lecture method of instruction would have to be carefully designed to offer new and fascinating material to the ENFP. Uninspired, routine details would bore the ENFP and turn him off to learning effectively. Humdrum detail would have to be eliminated in lecture in favor of offering imaginative projects that might be carried out in the future. The tutorial method of instruction would be effective if the tutor was an innovative individual similar to the type described as best for the student with the personality type of INFJ. The ENFP could learn effectively by all methods of instruction with the exception of audio recordings. Audio recordings would not be an effective method of instruction for the ENFP.

Readings and field trips were the preferred teaching methods selected by the student nurse with the personality

type of ENFJ. The ENFJ is described as being chiefly concerned with people. He is most interested in books, and has curiosity for new ideas and sees the possibilities. Readings would fit his or her need to use language and gather new ideas and information. Field trips would provide him with human contact and the opportunity to speak with people about their environment. Another effective method of instruction for the ENFJ would be small group work. Methods of ineffective instruction to be avoided for the ENFJ would be audio recordings, discussion, laboratory, programmed instruction, motion pictures/TV, pictures/slides, symbols, lecture, tutorial, and demonstrations/role playing.

Small group work was the preferred learning style of the student nurse with the personality type of ENTP. The ENTP has been described as an enthusiastic innovator who is analytical and critical of his inspirations. Uninspired routine and humdrum detail are hated by the ENTP. Small group work could provide the human contact desired by the ENTP and the exciting discussion he or she enjoys. To be an effective method of instruction, the small group work could be accompanied by objectives that would require other than routine and detail type problems to be solved. Reading would also be considered an effective method of instruction for the ENTP. The methods of instruction that would be ineffective are numerous. The methods to be avoided for the ENTP would be demonstrations/role playing, audio recordings, tutorial, lecture, field trips, programmed instruction, symbols,

pictures/slides, motion pictures/TV, laboratory, and discussion.

Selected successful registered nurses, when identified by personality type, preferred to learn by certain teaching methods. Learning styles least preferred were also determined. Registered nurses with the personality type of ISFJ ranked discussion and tutorial as their most desired instructional method. The ISFJ has great concern for the feelings of people and exhibits tact and sympathy. He likes facts that are clearly stated and put on a realistic basis. The tutorial method of instruction could be provided for the ISFJ, which allows for the characteristics of this personality type to be utilized efficiently. The tutor selected to work with this individual would have to be able to present materials in a factual manner, emphasizing the importance of the facts to the here and now. A practical, conservative type of tutor could best work with the ISFJ, rather than a tutor who is innovative, with an eye to the future. The discussion method of instruction could be combined efficiently with the tutorial type of instruction, providing instant feedback for the ISFJ as he or she tests out their grasp of the new facts, with the tutor in a discussion type style. Lecture and readings would also be used effectively with the ISFJ to assist him in the learning process. Methods of instruction to be avoided if the ISFJ is to learn effectively are field trips, symbols, audio recordings, demonstrations/role playing, motion pictures/TV, pictures/slides, programmed

instruction, and small group work.

The registered nurse with the personality type of ISTJ ranked laboratory as the most preferred learning style. The ISTJ finds it difficult to see the needs that differ widely from his own. He is likely to dismiss them offhand as non-essentials. However, he may come to sympathize with them when he sees something make a difference to someone else right before his eyes. The ISTJ is super-dependable and likes facts. Laboratory instruction could provide the ISTJ with the realistic environment that he needs to see the facts. Objectives for the laboratory setting could be designed in such a manner that laboratory experience would provide an opportunity to see the ideas and beliefs of other people in action and the extent to which it matters to those people involved. Utilizing a teaching method such as this would feed into the need of the ISTJ to see other people's differing beliefs matter to them, right before his or her eyes. A laboratory experience for the ISTJ would assist development of his judgment, which, if it is not developed, may cause the ISTJ not to get around to dealing with facts and leave him silent, ineffective, and almost impossible to understand. Readings would also provide the ISTJ with an effective method of learning. The ineffective methods of instruction for the registered nurse with the personality type of ISTJ would include audio recordings, lecture, programmed instruction, field trips, discussion, symbols, motion pictures/TV, pictures/slides, tutorial, small group

work, and demonstrations/role playing.

The registered nurse with the personality type of INFP preferred to learn by laboratory method of instruction. The INFP has been described as liking to concentrate on a project and disliking all details not relevant to any deep interest. The INFP is likely to have a gift for expression, especially in writing. Laboratory objectives could be designed to offer this individual the opportunity to concentrate upon a project in a detailed manner, with opportunity to devote great energy to the project. The findings of the INFP could be presented in writing, with steps that would aid in his growth to develop his gift for expression. Since the INFP is twice as good at a job he believes in, he should be consulted prior to laboratory experience for his ideas about the objectives for his laboratory experience and assist in setting up the objectives. Other effective learning styles for the INFP would include field trips, lecture, and discussion. Certain methods of instruction should be avoided with the INFP: audio recordings, readings, demonstrations/role playing, motion pictures/TV, pictures/slides, symbols, tutorial, programmed instruction, and small group work.

Demonstrations/role playing was ranked as the preferred learning style by the registered nurse with the personality type of ISFP. The ISFP is described as consistently underestimating himself. He is a perfectionist wherever his feeling is engaged, and is usually happiest at some individual work involving personal values. Objectives

for a role playing method of instruction could provide a learning setting that would allow the ISFP to participate in a mock-up problem that is close to his values. The instructor guiding the role playing would use a form of positive stimulus response method of feedback to the ISFP in an attempt to aid the individual in gaining self-confidence. The ISFP could be assisted to see the realities in this type of learning setting. Another type of teaching method that is effective with the ISFP is laboratory. A similar type of approach could be used for the laboratory as was used in the role playing situation. Many types of instructional methods would be ineffective for the registered nurse with the personality type of ISFP. The methods to be avoided are motion pictures/TV, discussion, lecture, tutorial, symbols, programmed instruction, small group work, field trips, pictures/slides, readings, and audio recordings.

The registered nurse with the personality type of ESFP ranked small group work, motion pictures/TV, field trips, and demonstrations/role playing as equal in learning style preference. The ESFP has been described as a good-natured realist who accepts the facts and uses them, whatever they are. There is a sort of effortless economy in the way he goes at a situation, never uselessly bucking the line. In this study the ESFP is the only group that has chosen numerous learning styles as number one choice. This is compatible with the adaptability factor of the ESFP individual. Since he is a realist, he likes first-hand information more than he

does getting the same information from books. All of the methods chosen here eliminate the use of a great amount of written language, such as is found in books. All of the chosen methods of instruction could be prepared prior to experience, with objectives that would involve little written language and outline a learning experience where the ESFP could be actively and physically involved in the learning process. This type needs clear, concise objectives for the learning process. Other types of teaching methods that would benefit the ESFP would be laboratory and discussion. The least effective method of instruction for the registered nurse with the personality type of ESFP would be readings. Other ineffective methods include programmed instruction, tutorial, pictures/slides, lecture, symbols, and audio recordings.

The registered nurse with the personality type of ENFP selected small group work as the preferred learning style. The ENFP has been described as enthusiastic, concerned with people, and skillful in handling people. The ENFP has remarkable insights into the possibilities of people and is interested in their development. Objectives for small group work could be set up to utilize the positive qualities of the ENFP and aid in maximum development. As the ENFP has the innate ability to inspire other people, he could be utilized in the group with other personality types represented, to add enthusiasm to a project. The ENFP hates uninspired routine, and objectives for group work should attempt to eliminate

this type of material. Other effective methods of instruction for the registered nurse with the personality type of ENFP would include discussion, motion pictures/TV, tutorial, readings, field trips, pictures/slides, and laboratory. Ineffective methods of instruction to be avoided would be audio recordings, symbols, programmed instruction, lecture, and demonstrations/role playing.

Laboratory was selected as preferred learning style by the registered nurse with the personality type of ESFJ. The ESFJ has been described as being chiefly concerned with people and is best when talking with people. He thinks best when talking with people. The laboratory experience could be set up to allow for communication with other people in the group. Objectives written prior to the learning experience could incorporate discussion between individuals as part of the laboratory content. The interpersonal communication would provide for the warmth of human relationship so prized by the ESFJ. Several other teaching methods could be effective for the registered nurse with the personality type of ESFJ: tutorial, motion pictures/TV, pictures/slides, small group work, demonstrations/role playing, programmed instruction, and discussion. The ineffective methods of instruction to be avoided include audio recordings, lecture, symbols, field trips, and readings.

The registered nurse with the personality type of ESTP ranked pictures/slides as the preferred method of instruction. The ESTP has been described as being interested in machinery.

He knows and remembers more facts than any other type. The ESTP gets more information from first-hand experience than from books. Slides as a teaching method could be set up with very short written objectives prior to the slide presentation. A slide instructional experience could provide for a factual presentation and could involve the ESTP in operating the machinery. This combination could provide the ESTP with the facts and the opportunity to obtain information in a first-hand manner rather than from books. Other effective teaching methods for the registered nurse with the personality type of ESTP would include field trips, discussion, and demonstrations/role playing. Ineffective methods of instruction to be avoided include programmed instruction, readings, laboratory, audio recordings, lecture, symbols, and motion pictures/TV.

IMPLICATIONS

The conclusions reached in this study serve as a guide to the formulation of several implications.

1. Because of the diversity of personality types between student nurses, it is suggested that discussion sessions or scheduled opportunities for communications be arranged on a regular basis. These sessions would help provide a more open and communicative atmosphere now and establish a basis for them when they are graduates and working with many varied personality types.

2. To create a more trusting atmosphere among successful registered nurses, discussion sessions or opportunities for communication should be arranged on a regularly scheduled basis. In these sessions individuals could openly ventilate their opinions, grievances, and questions about the various aspects of the working environment. Communication and interest in understanding each other may result as opposite personality types learn to understand how each may contribute to the other.
3. Students and educators, and registered nurses and their educators should consider a joint development of seminars and workshops where they can meet together and exchange views as well as learn about various aspects of the health professions.
4. There seems to be a need for students and educators to meet together to discuss the pros and cons of various aspects of curriculum development.
5. Educational programs should be structured in such a way as to allow for the similarities and differences of personality type between individuals.
6. There is a need for curriculum development which allows for these individual similarities and differences in educational programs.
7. There seems to be a need to provide learning experiences for instructors in regard to personality type and learning style in order to provide optimum student development and learning, being cognizant of personality

similarities and differences.

8. This systematic approach could provide for students' learning modality and learning tempo.
9. Through development of personalized instructional packages and individualized programs of instruction, students can experience various forms of instructional methods that are directly related to objectives. Learning and evaluation would be guided by the same objectives.
10. Personality types of students and registered nurses indicated that many are of the Sensing type. This type of individual needs specific objectives spelled out for learning and evaluation. This type of outline will assist the Sensing individual to reach his highest potential of development.

NEED FOR FURTHER RESEARCH

It is apparent from this research that much work needs to be done in studying the learning styles of students. This study has shown that individuals and groups, according to their personality type, prefer to learn in specific ways. Individual Jungian personality types prefer to learn in specific ways. They also have a definite preference for the method they choose to learn by in the most effective manner. A disliked method of learning is also evident in this study.

Based upon the insights into personality types and learning styles gained from research with the Myers-Briggs

Type Indicator and the Media Effectiveness Chart, the following suggestions are offered for future study:

1. This study should be continued and expanded to include:
   a. Larger groups of student nurses.
   b. Larger groups of successful registered nurses employed in health facilities.
   c. Other allied health students and personnel employed in health facilities.
2. Another research study involving the relationship of this study's data to the personality type learning style of other health professionals, particularly:
   a. Nurses in various specialties.
   b. Physicians in various specialties.
   c. Occupational therapists.
   d. Respiratory therapists.
   e. Medical assistants.
   f. Licensed Vocational Nurses.
   g. Nurse Associates.
   h. Physicians' assistants.
3. Personality types learning styles of students and their instructors in various health professions could furnish information that would be utilized to provide an appropriate learning climate.

The need for further study on the personality type learning style of various students in the health professions cannot be overemphasized, if indeed the learning climate for a student could appropriately be set up so that the student

could function to his maximum potential. This study has found that there are differences in the way that individuals learn most effectively and also that personality types prefer to learn in specific ways. It is the hope of this investigator that this information will serve as a foundation to improve and strengthen the curriculum for student nurses.

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APPENDIX

Type Table (Blank)

Descriptions of Jungian Personality Function Types

Contributions Made by Each Preference to Each Type

Mutual Usefulness of the Opposites

Effects of Each Preference on Work Situations

(The contents of the Appendix were published by Isabel Briggs Myers in The Myers-Briggs Type Indiciator Manual, Princeton, New Jersey: Educational Testing Service, 1962.)

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